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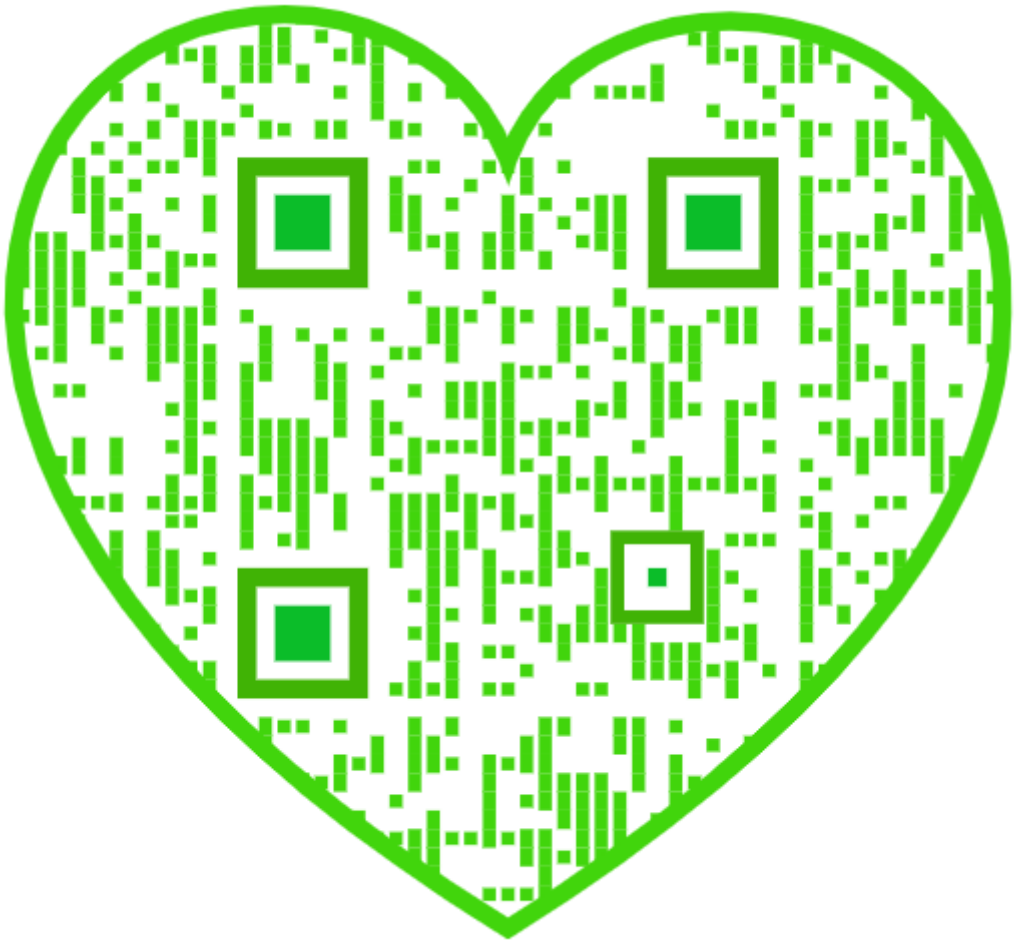

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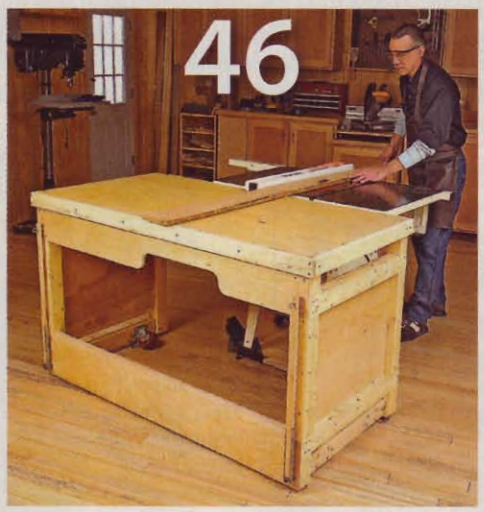

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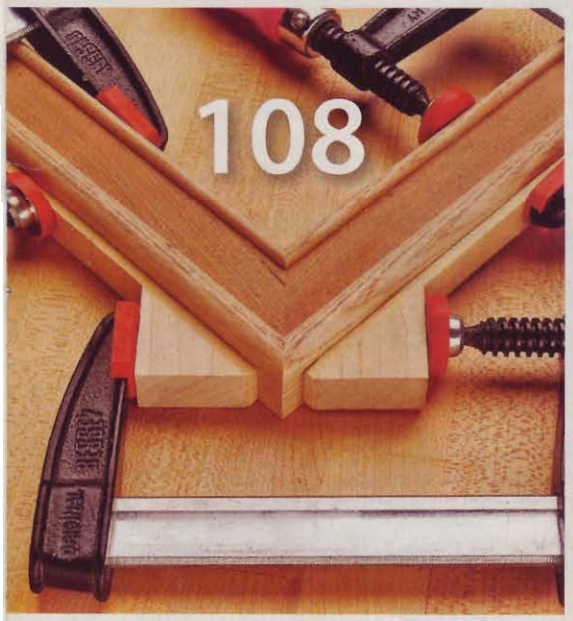

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Owen built a dyed oak mission-style coffee table as a gift.

Bob designed and built these Chinese checker games using an old game board as a template.

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In Memoriam — E.T. Meredith III (1933–2003)

During a mission to Honduras, Mark (*center*) built tables, benches, and desks for an orphaned-boys school.

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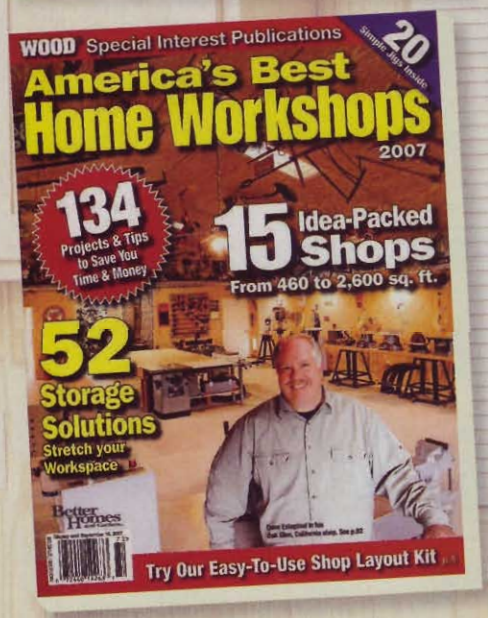
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Editor's Angle

The NEW WOODmagazine.com You'll love it!

We've recently gone through an intensive, year-long process to completely revamp the *WOOD*® Web site. Our goal was ambitious: create the most user-friendly, entertaining, information-packed woodworking destination on the Web. I'm hoping you will check it out, and then let me know how well we've done.

Relaunching WOODmagazine.com was a huge task. Here's the team that got it done (from left): Victor Mutambuki, Jennifer Schulze, Marlen Kemmet, Christy Ludemann, Dave Campbell, Ashley Werner, Matt Snyder, Kate Stone, and Shannon Early.

If you've visited woodmagazine.com lately, you may not believe all of the helpful, absolutely free woodworking information you can find there. Thanks go to the cyber-savvy crew *above* who rebuilt every page of the site, reorganizing it so you can quickly find exactly what you need. No matter your woodworking requirements, you'll get the answers and information you need 24 hours a day, 7 days a week.

Of course all of your favorite features are still there, just enhanced and expanded: 14 forums for asking for woodworking advice (and sharing it); a comprehensive index to hundreds of *WOOD*® magazine articles and projects; a monthly tool sweepstakes; free downloadable plans; and a rapidly growing archive of incredibly informative, free woodworking videos.

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Please let me know what you think of these improvements. Just e-mail me at bill.krier@meredith.com

Happy surfing,

Bill Krier

Sounding Board

Our bulletin board for letters, comments, and timely updates

Reader carves up a new twist for cutting board

I really liked your end-grain cutting board in issue 172 (October 2006, page 82), and planned to make it from scrap stock in my shop. Then, when I saw the casserole carrier in issue 173 (November 2006, page 40), I had the idea to merge the two. I started by building the cutting board from cherry, maple, and walnut scrap. Then I went a step further and added tall sides. I used a round-nose router bit to relieve the inside face for a smooth countour where it meets the base, and I rounded the top edges with a round-over bit. Now it doubles as a serving tray as well as a cutting board when flipped over. I made the carrier with handles to fit this serving tray.

—Steve Zentko, Struthers, Ohio

Resourceful reader gains storage in bench

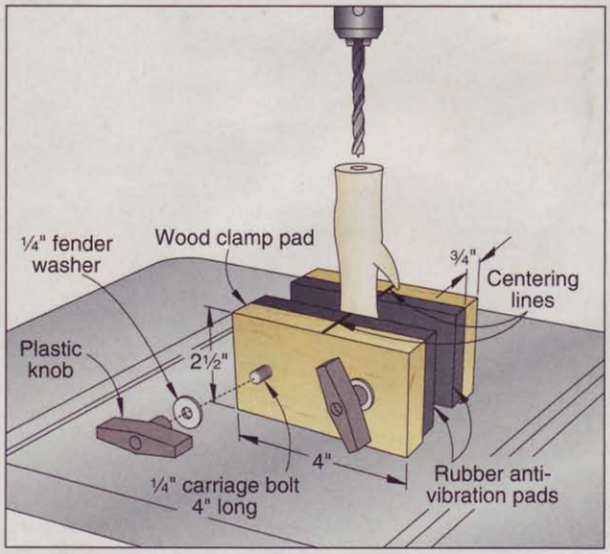
My wife has always wanted a hall bench for our home. As I was looking through my back issues of *WOOD®* magazine, I found the answer on page 42 of issue 145 (November 2002). As we talked about it she asked if I could enclose the bottom shelf for additional storage. So I did just that with three flat panels on the front and back to mirror the sides. I lined the interior with aromatic cedar, and then hinged the seat to double as a lid. I gave it to her for Christmas 2006.

—John Hoffman, Lancaster, N.Y.

Drill antlers with this fail-safe clamping jig

I've been turning pens from deer antlers for years, and after reading your antler-drilling tip in issue 173 (November 2006, page 24), I thought I'd share my remedy for tricky clamping. Because antlers are almost never straight and smooth, I fashioned a wood vise with ⅜"-thick rubber anti-vibration pads (Woodcraft part #04A42, $16.50, woodcraft.com or 800-225-1153) that conform to the shape of the antler when tightened. This makes for a sturdier, safer hold for boring. Be sure to leave the rubber pads ¼" short of the bottom edge of the clamping blocks to allow for expansion under clamping pressure. To be even safer, clamp the vise to the drill-press table. I draw centering lines on the top and bottom edges of the vise jaws; then align the middle of the antler to the lines to avoid boring through the sides of the antlers. Wear a respirator or dust mask to avoid breathing the fine antler dust.

—Billy Allmon, Fort Worth, Texas



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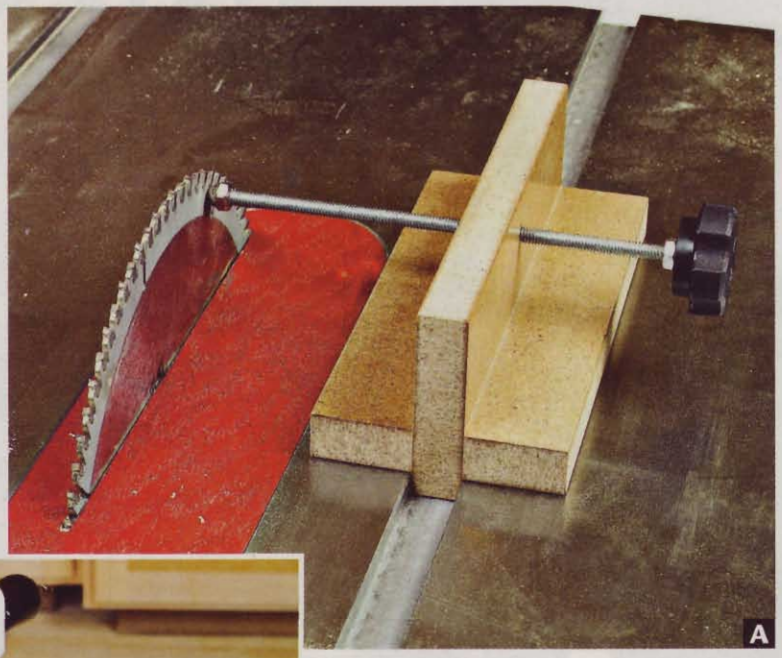
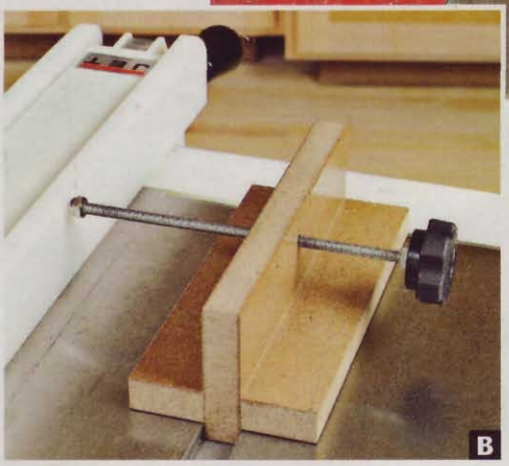
Tablesaw alignment block

End burned cuts, kickback, and less-than-perfect miters.



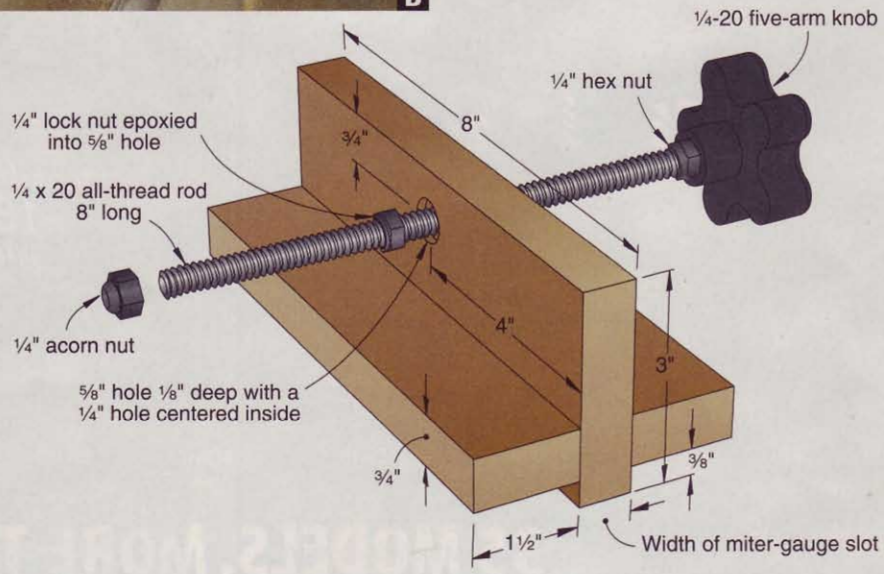
If the acorn nut touches the front and back of the blade or fence the same, you're parallel. If a gap or tighter squeeze exists at the front or back, you need to correct the alignment.



Use this simple jig to align both your tablesaw blade and rip fence for clean, accurate cuts. Start by cutting the three pieces of ¾"-thick stock to the sizes shown in the drawing. The center piece should be just a hair narrower than your tablesaw miter-gauge slot so it slides back and forth easily without play. Drill the holes in the center piece to the stated sizes. Epoxy a ¼" lock nut into the ⅝" hole, being careful not to get any epoxy into the inside threaded portion of the nut.

Glue and clamp the side pieces to the center piece. Crosscut a piece of ¼×20 all-thread rod to 8" long. Thread a ¼" hex nut about ½" onto one end of the rod. Then, thread a plastic knob onto the same end. Tighten the hex nut against the knob to lock the knob in place. Thread the rod through the lock nut (it threads slowly) and thread an acorn nut onto the end opposite the plastic knob.

To align your blade to the miter-gauge slot, position the block where shown **[Photo A]** at the front edge of the fully raised blade. Twist the threaded rod until the acorn nut just touches the blade. Move the block to the back edge of the blade. If there's a tighter fit or a gap shows between the blade and acorn nut, you'll need to adjust the trunnion or table (depending on your saw) until the blade is parallel to the slot. Use a similar process to align the rip fence **[Photo B]** parallel to the miter-gauge slot.



Find more shop-organizer plans at:
woodmagazine.com/freeplans

Project design: **Howard Autry, Sonora, Calif.**

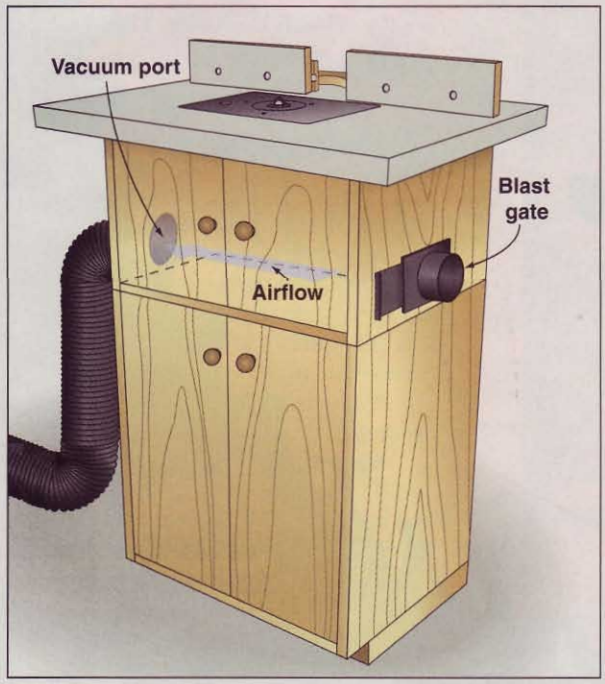
Shop Tips

Helping you work faster, smarter, and safer

Out with the bad air, in with the good

Top Shop Tip

Many woodworkers hook up a 4" dust-collection hose to a mostly enclosed tool cabinet, such as one below a router table or downdraft table. They figure that by pulling 4" worth of air through a 1" bit opening, the dust and chips ought to go screaming through the box and into that dust hose. But in truth, they're choking off the airflow, killing the dust-collection efficiency.

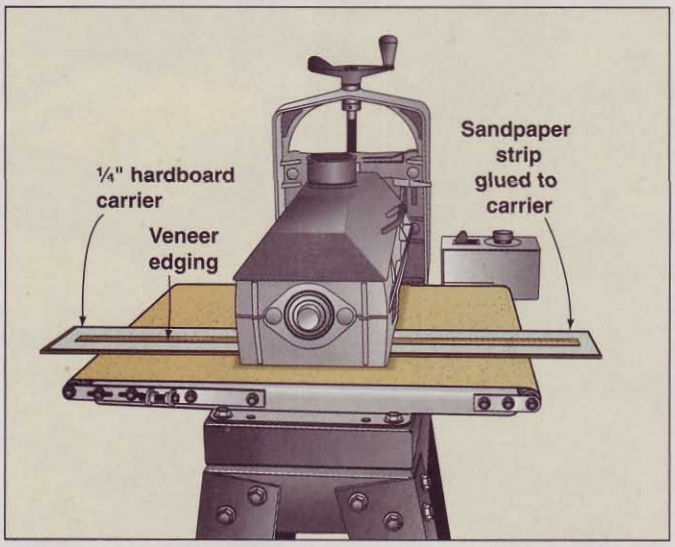


To remedy this problem, simply install a dust-collection blast gate on the cabinet, opposite the hose for outgoing dust, as shown. By opening this blast gate, you create a "river" of air flowing through the cabinet. Debris gets pulled into the river and carried downstream to the collector. If you lose too much suction with the gate wide open, gradually close it until you achieve maximum dust collection.

—Jim Kahl, Edgewood, Md.

Slide thin strips through the sander on a nonslip carrier

To make thin hardwood strips for edging and Shaker-style boxes, I bandsawed stock to rough thickness and then tried to sand the pieces to final thickness—about ⅛"—on my drum sander. As the strips approached 3/16", however, they would sometimes break.



I solved the problem by gluing 120-grit sandpaper to a ¼×6×36" piece of hardboard. Now the thin wood rides through the sander perfectly on the carrier board, and I can sand strips uniformly to ⅛" or thinner regardless of grain.

—Thomas L. Peters, Midland, Mich.

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The Top Tipster

Photo: Kristine Buls

Jim Kahl's interest in woodworking smoldered for about 20 years while he built his home-improvement business. Then, about four years ago, his wife Carol asked him to build a frame for a stained-glass window she was making. That rekindled his passion for all things wood, and he has since built much of the furniture in their home near Chesapeake Bay. That includes the entertainment center, shown *above*, that features interchangeable seasonal panels. Jim's Top Shop Tip, at *left*, proves that glass isn't the only sharp thing in his shop.

We're sending a Penn State Industries Tempest 142CX cyclone dust collector to Jim Kahl for submitting the Top Shop Tip in this issue. Great job, Jim!

Top tips earn tools!

Tell us how you've solved a workshop stumper, and you'll get $75 if we print it. And, if your idea garners Top Shop Tip honors, we'll also reward you with a tool prize worth at least $250.

Send your best ideas, along with photos or drawings and your daytime phone number, to **Shop Tips, *WOOD* Magazine, 1716 Locust St., LS-221, Des Moines, IA 50309-3023.** Or, by e-mail to **shoptips@woodmagazine.com**. Include your contact info in the e-mail as well.

Because we publish only original tips, please send your tips only to *WOOD*® magazine. Sorry, submitted materials can't be returned.

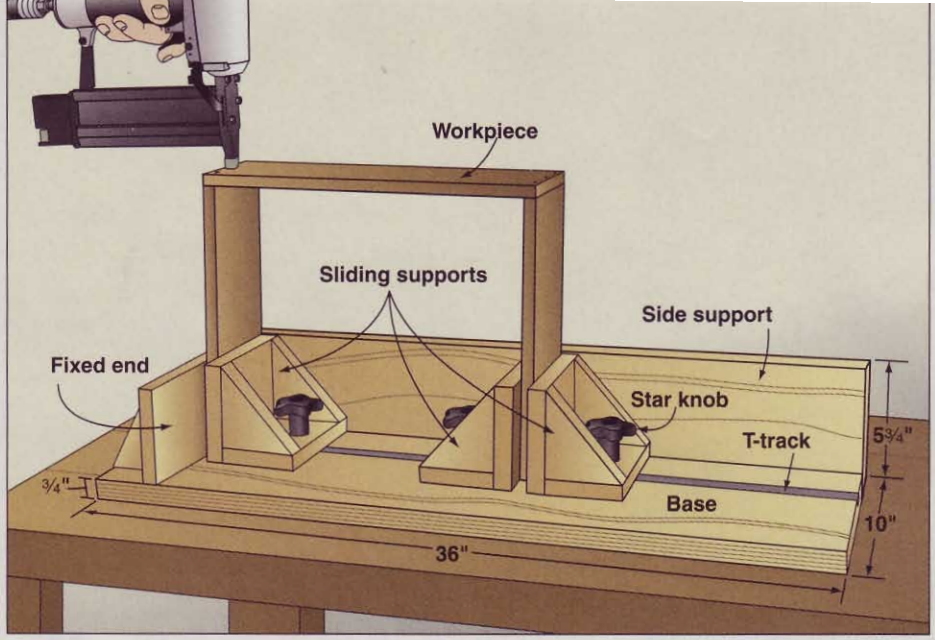
Shop Tips

A sure-footed partner for unsteady nailing

Nailing drawer boxes together used to frustrate me as I tried to steady the wobbly parts while keeping them aligned and trying to drive a nail. This clamping jig adds stability to this ungainly process.

You can make the jig to whatever size best suits your needs, but the dimensions shown will accommodate very large and fairly small boxes. Build the jig from any type of scrap stock; you'll find the star knobs and T-tracks at woodworking supply stores.

—Lynn Lawrenz, Algoma, Wis.

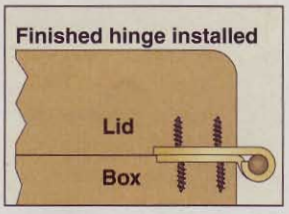


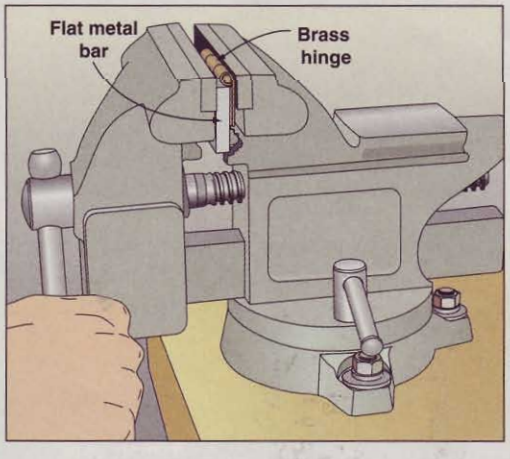
Reshape low-cost hinges for a sophisticated look

I make a lot of jewelry boxes and other small boxes that I give as gifts. To get a tight fit between the lid and the box, though, I found I had to either use an expensive hinge or cut a mortise deeper than the hinge leaf to compensate for the thickness of the hinge's barrel. I solved this problem by reshaping less-expensive hinges so the leaves lie flat against each other in the closed position.

To reshape the hinge, place it in a vise, as shown, so the hinge, including the barrel, is completely inside the jaws, with a thick, flat metal bar on one side of the hinge just below the barrel. Now tighten the vise securely until the leaf conforms to the metal bar. If done correctly, the hinge leaves will lie flat against each other as if they were manufactured that way.

—Gene Carter, Morgan, Utah





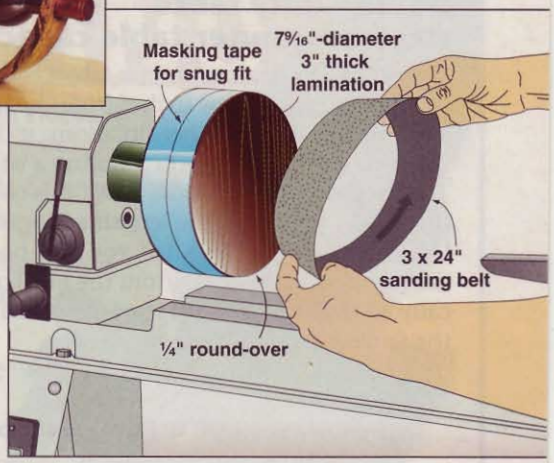
Sand to the beat of a lathe-mounted drum

I made a few of wine bottle holders, shown at *near right*, from *WOOD®* magazine issue 167 (November 2005, page 8) for Christmas gifts. After cutting out the holder on my bandsaw, it was easy enough to sand out the outside curve with my belt sander, but the inside curve was a different story. The crescent measures about 10" in diameter and the largest sanding drum I could find had only a 3" diameter, which made it difficult to get a smooth surface. Then I realized a 3×24" sanding belt would work if I created a mega-sized sanding drum.

First, I glued up a 3"-thick blank out of 2×10 stock and bandsawed it into an 8" disc. Next, I mounted the blank on my lathe and turned it to 7⁹⁄₁₆", with a slight round-over on the edge of the drum to ease belt installation.

One thing I've learned after using the drum for awhile: Not all 24" sanding belts are created equal. If the belt is too tight, turn the drum slightly smaller. A slightly loose belt is better because the diameter can be increased or reduced with layers of masking tape.

—Jerry O'Banion, Meadow Grove, Neb.

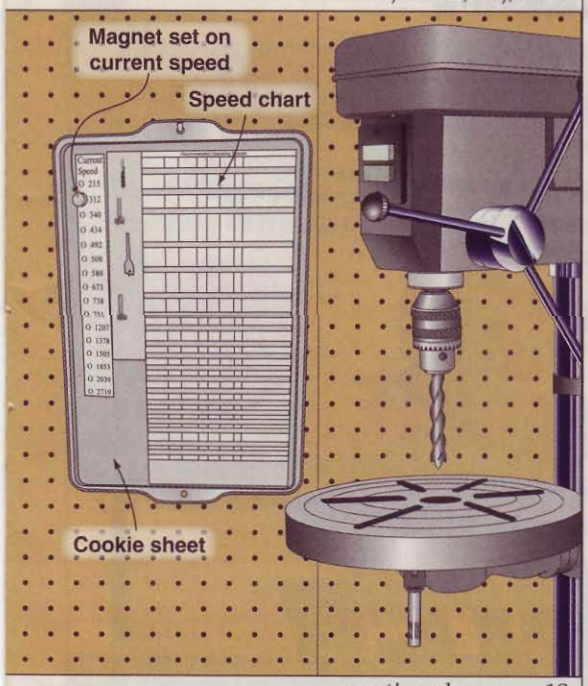


"Cheat sheet" meets cookie sheet

I've used the *WOOD* magazine "Drill Press Speed Chart" (woodmagazine.com/charts) for years, trying to keep it taped up on the perforated hardboard behind my drill press, but it kept falling off. To prevent that, I grabbed an old cookie sheet from the kitchen, taped the chart to the metal, and hung it on a hook.

Then, taking it a step further, I made an additional chart of my drill press speed settings, added it to the sheet, and stuck on a magnet to identify the current speed setting. Now I know whether I need to open my drill press case to change its speed.

—Larry Cramer, Troy, Mich.



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CANADA: Jardel Distributors, Inc. 6505 Metropolitan Blvd. East, Montreal, Quebec H1P 1X9
UNITED KINGDOM: Unit 5, ZK Park, 23 Commerce Way, Croydon CR0 4ZS Surrey
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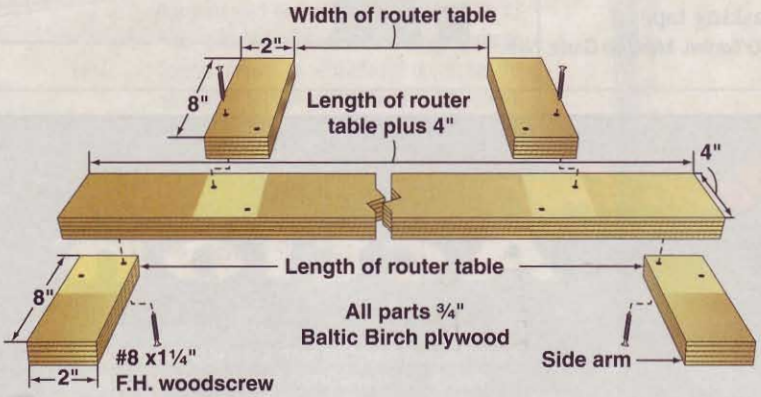
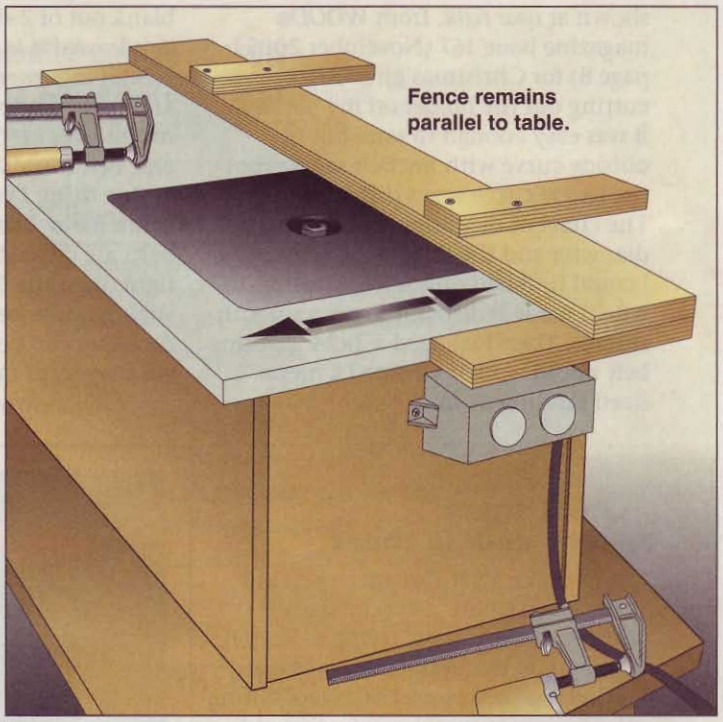
Double-duty fence stretches router table capacity

The problem with most router tables is that the fence won't adjust more than a few inches from the bit. While that's fine for edge work and a few other situations, it doesn't make full use of the table (for example, when fluting a wide workpiece).

To improve the situation, make this two-way alternate fence that works with both the length and width of your table. Depending on the table size, you may be able to firmly position the fence up to 20" away from the bit. The side arms automatically align the fence with the table and a pair of bar clamps hold the fence solidly in place.

—Allan Rice, Winnipeg, Man.





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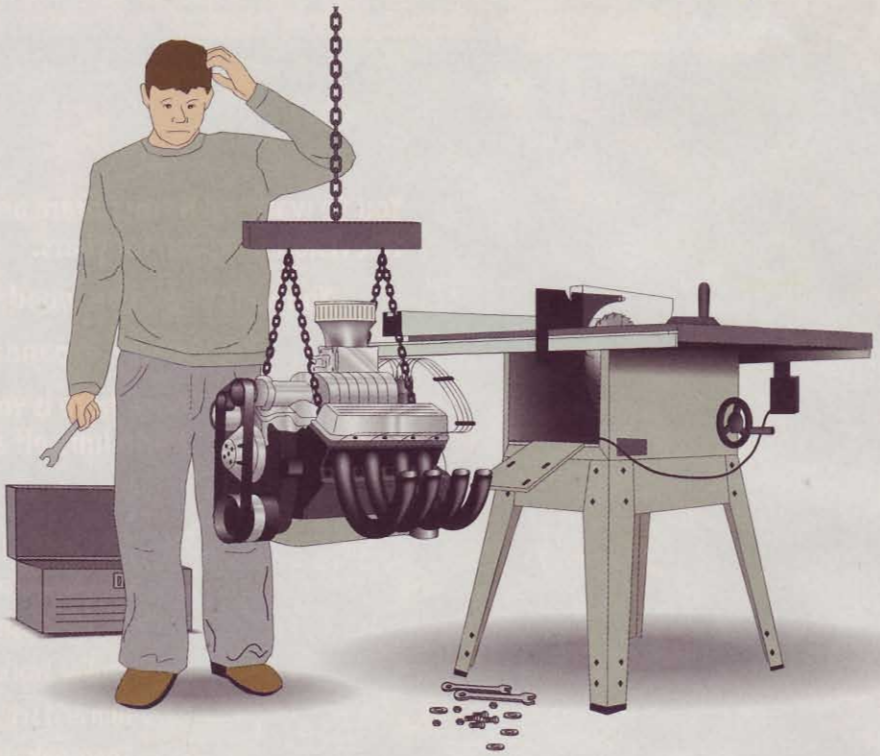
Find alternatives to supersizing your tablesaw motor

Q: I have trouble ripping thick hardwood boards with my 10" contractor-style tablesaw. Assuming the motor mount would fit, can I replace the existing 1½-hp motor with a 3-hp motor?

—Rich Clayton, Ames, Iowa

A: Swapping motors won't double your saw's cutting power. And it could cause more problems than it solves, Rich. Unlike a cabinet-style saw that's designed to handle a 3- or 5-hp motor, there's no guarantee any added power could be delivered to the blade by a contractor saw's belt drive. And because the motor's weight provides tension on the drive belt, a hefty 3-hp motor could apply more strain to the arbor bearings than they were designed to handle.

A better—and cheaper—way to boost the cutting efficiency of your saw is to rip with a blade designed for ripping. For example, replace your 40- or 50-tooth general-purpose blade with a 24-tooth ripping blade. A thin-kerf blade requires still less muscle because it takes a smaller kerf out of your stock. Thin-kerf blades can deflect in thick stock, though, so consider adding a pair of blade stiffeners even if they reduce your maximum cutting depth. With that done, make certain your saw gets sufficient electricity. If it trips a breaker under the strain of ripping thick stock, rewire the saw for 220 volts to handle the added amperage draw.



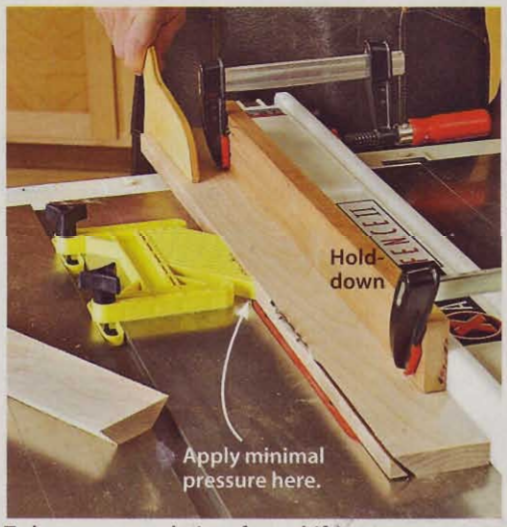
Set up your saw for bevels

Q: I'm making a platform bed with 3"-square curly maple legs, each made from four ¾×3" pieces beveled 45° on the edges. I tilted my (new) tablesaw blade and checked the angle twice. But out of four boards, two align only halfway along the bevels, and the other two didn't line up at all—as if the bevel changed in mid-cut. I reset the saw again from scratch with the same results. What's wrong?

—Jim Rushing, Vancouver, Wash.

A: Let's rule out the most obvious causes first, Jim. Check your saw alignment by first making the blade dead-on parallel with the table's miter slot. Then check the fence to ensure it's parallel with the miter slot, and therefore the blade. Use a drafting triangle to check the angle of your blade; then lock the bevel wheel in place. Cut test pieces from scrap to check for joint gaps, and fine-tune the angle. With your tablesaw in order, next make sure you've machined all stock flat, straight, and square.

For controlled bevel cuts, attach a hold-down to your fence, as shown at *right*. On both passes, use a feather board to keep the stock snugly against the fence. On the second pass, the hold-down will help prevent the beveled edge from trying to climb up the side of the fence.



To keep your workpiece from shifting as you cut, use both a feather board on your saw table and a hold-down clamped to the fence.

Quick & Easy Jig

Edging Flush-Trimmer

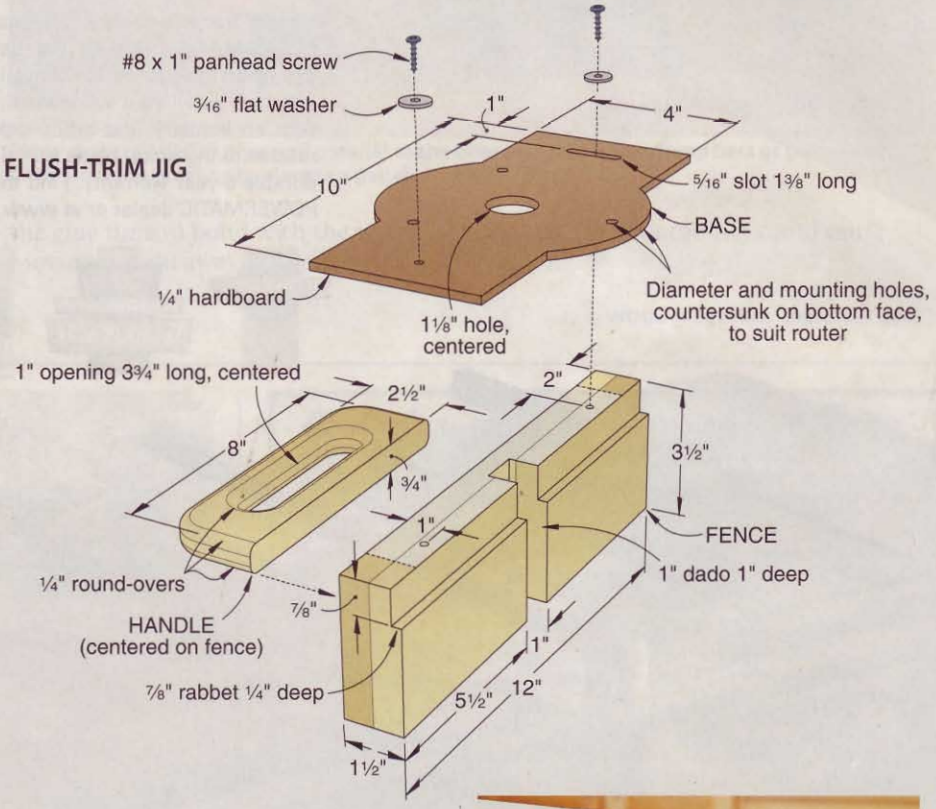
Create even-Steven edging with this easy-to-make accessory.

Here's a no-nonsense router jig that helps you trim solid-wood edging perfectly flush with plywood panels. No more heavy sanding and no risk of sanding through the thin plywood veneer. The jig base and handled fence enable you to safely keep the router stable and square on the workpiece.

To make the jig base, remove your router baseplate and measure its diameter. Then cut a piece of ¼" hardboard to a width equal to your measurement and 10" long. Center the baseplate on the hardboard. Trace around the baseplate, and mark centerpoints for the router mounting holes and 1⅛" center hole. Next, draw lines to complete the layout, and mark a centerpoint and lay out the slot for screw-mounting the base to the fence, where dimensioned on the drawing, *right*. Bandsaw the base to shape, drill the holes, and form the slot.

From ¾" stock (we used poplar), cut a 2½×8" blank for the handle. Lay out and machine the handle to shape.

From laminated ¾" stock or a pine 2×4 (1½×3½" actual), cut the fence to size. Cut or rout the rabbet and dado in the fence to the dimensions shown.



Assemble the jig

Glue and clamp the handle, centered, to the *outside* face of the fence. Next, mount the base to your router, and position the base on the fence with the mounting hole and center of the slot offset 1" from the *outside* face of the fence. Drill pilot holes into the fence, and drive the screws with flat washers.

Now let's put it to work

To use the jig, loosen the screw in the slot in the base. Align the fence with the flush-trim bit bearing, as shown in the photo, *right*, and tighten the screw. For a panel that has a slight bow, position the fence with the bearing a whisker proud of the fence for the best result. Secure the workpiece safely vertically in a vise with the edging up. Adjust the bit height as needed, and position the jig base on the edging. Holding the router with one hand and keeping the fence tight against the panel with the other, start the router and trim the edges. To flush-trim the ends, make a simple cutoff guide as explained in the **Shop Tip** on *page 53*.

Illustrations: **Roxanne LeMoine; Lorna Johnson**

Use a straightedge to align the fence with the flush-trim bit. Then tighten the slot screw to secure the alignment.

Wise Buys

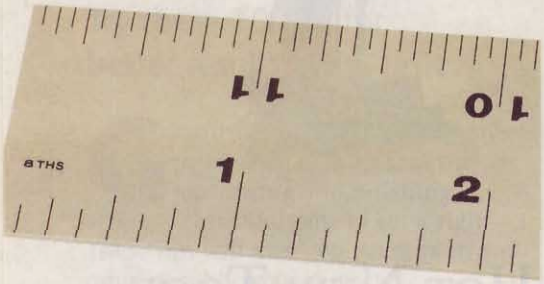
Our Editors Test
Precision Steel Rules

Why buy?

One of the most important woodworking tools you should own is a dead-on-accurate steel rule. It not only helps you mark perfect measurements, but it also proves indispensable at setting blade and bit heights on machines, as well as checking the accuracy of measuring tapes. If you can get only one such rule, we recommend a 12" version. We tested several models in each of the three categories shown below, and then named our favorite rule for each category. All of our picks here feature a dull finish (to diffuse glare), etched markings (which are more precise) rather than printed or stamped (which can rub off with wear), and scales in at least ⅛" and 1⁄16" increments. While a 1⁄32" scale proves useful, we find 1⁄64" scales difficult to read and mark.

STANDARD BENCH RULE

Lee Valley, model 60N20.06, $10



Editor test-drive:

Lee Valley's rule provides the essentials for a bench rule at an attractive price. Its matte finish on hardened stainless steel proved the best at resisting glare of the four standard bench rules we tested. It has easy-to-read ⅛" and 1⁄16" scales along one side and 1⁄32" and 1⁄64" scales on the other. Another nice feature: The etched fraction lines are proportional for quick reference, with ½" marks longest, ¼" and ¾" next longest, and so on.

I also preferred the beefier thickness of Lee Valley's rule (.040") to that of Starrett's standard rule (.025"). The only shortcoming I could find with the Lee Valley rule was the absence of end scales: perpendicular markings at one or both ends of the rule. These prove helpful for setting router bit and saw blade heights. Starrett's rule has these markings, but its $32 price tag triples that of the Lee Valley.

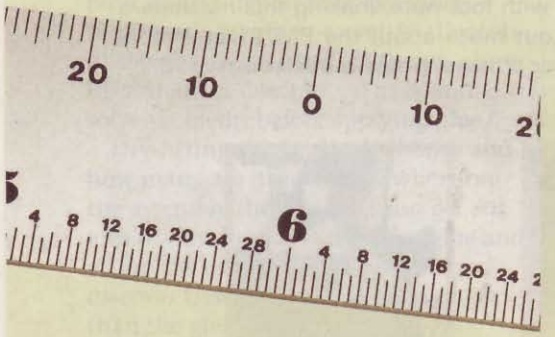
—Tested by Jeff Mertz, Design Editor

To learn more:

800-871-8158; leevalley.com

CENTERING RULE

Hartville Tool, model 13404, $20



Editor test-drive:

If you're like me, you have a tough time justifying the purchase of a rule devoted solely to finding the center of a board. Hartville has the perfect compromise: A centering rule that's also an exemplary standard rule. I tried out five centering rules, and this one proved good enough to hold its own in the standard bench rule category. Hartville devotes only one of its four scales to centering, with markings in 10-mm increments. (It doesn't matter that it's metric; you only need symmetrical markings to find a centerpoint.) Just position the rule so matching increments rest on the endpoints, and mark the center at zero.

In addition to this feature, the Hartville rule has standard scales in ⅛", 1⁄16", and 1⁄32" increments. The etched markings are graduated in length for quick reference. It also has 1⁄32" end scales for machinery setup. The no-glare finish allows me to write on it with a pencil to mark a dimension when I need to make repeated measurements, and then wipe it off when I'm done. Because the tempered rule measures .042" thick, I can count on it to remain straight.

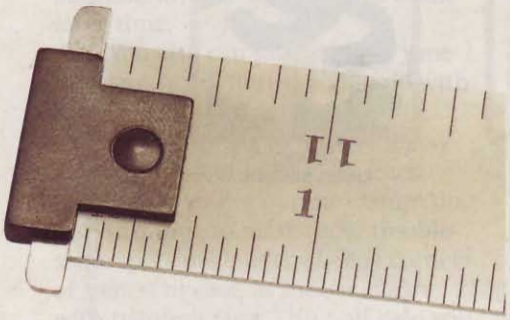
—Tested by Jan Svec, Projects Editor

To learn more:

800-345-2396; hartvilletool.com

HOOK RULE

L.S. Starrett Co., model CD604R-12, $38.50



Editor test-drive:

I love this rule because you get one of Starrett's high-quality bench rules with the bonus of a detachable hook. The hook catches on the end or edge of a board—like a retractable tape, but with dead-on accuracy. You can center the sliding bar that acts as the hook, or extend it entirely to either side. When you don't want to use the hook, simply back out the screw and remove it. Just be careful to not lose that tiny screw and hook. (The hook's holder keeps the rule from lying flat on its face, limiting the rule's use while it's attached.)

I like the markings (⅛", 1⁄16", 1⁄32", and 1⁄64") on the rule because they're identical to my 6" and 12" Starrett combination squares, which I rely on regularly. My eyes appreciate that consistency. Starrett's hook rule, however, features a matte finish; the combination squares are glossy. I also appreciate the heft of this rule—.042" thick—that will keep it from bending.

—Tested by Chuck Hedlund, Master Craftsman

To learn more:

978-249-3551; starrett.com

Router Clinic

Fast & Easy Template Routing

When you're making multiples of an irregular-shaped workpiece, make quick work of it with templates.

Most of us can crank out consistently straight and square project parts all day long. It's making duplicates of irregular shapes, such as the oval cutouts in the Photo-Frame Catchall Box on *page 74*, that throw us a curve. That's where a template comes to the rescue. Follow these guidelines to ramp up your consistency.

Step 1: Make the template

We like to make templates from ¼" hardboard or ½" medium-density fiberboard (MDF). Both prove easy to machine and offer greater stability than solid wood. Their only drawback: Corners and detailed areas can lose their shape or get dinged if dropped or bumped. If you want to make more-durable templates, use Baltic birch plywood. You'll get great stability and gap-free plys, but it can cost double or triple the price of MDF.

Lay out your design (to actual size) on the template material or adhere a copy of the pattern, as with the lid of the catchall box from the pattern on *page 76*. After drilling starter holes, use a scrollsaw or jigsaw to cut away the waste to within 1/16" of the pattern lines. Sand the edges smooth and remove the pattern.

Step 2: Use the template to duplicate workpieces

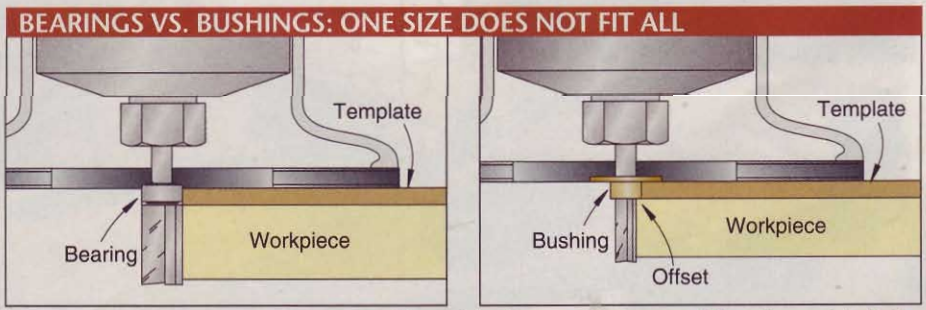
Position the template on your workpiece and trace the pattern with a pencil. Then cut it to within 1/16" of the line. Repeat for multiple workpieces.

Mount the template to one of the workpieces with cloth-backed double-faced tape. For the quickest, easiest way to trim your workpieces to shape use a bearing-guided flush-trim (bearing below the cutters) bit or pattern (bearing above the cutters) bit in your router or router table. The bearing on these bits rides along the template edge while the cutters remove the remaining material from the workpiece, making its edges flush with the template, as shown in the drawing *below*.

To begin, choose your bit. Both types of bearing bits work well for handheld and table routing, and each has an advantage. Flush-trim bits provide better visibility when used in a router table because the workpiece rides on the table with the template on top. Pattern bits, with the bearing between the cutter and the shank, don't need to trim the full workpiece thickness in one pass. Rather, you can use a pattern bit with a short cutterhead (and cheaper price tag) and make the cut in two or three passes.

For use in a router table, set the bit height so the bearing rides in the middle of the template's thickness. Insert a starter pin near the bit. (You don't use the starter pin for inside cutouts unless the opening offers enough room that it won't get in the way after you engage the bit.) Turn the

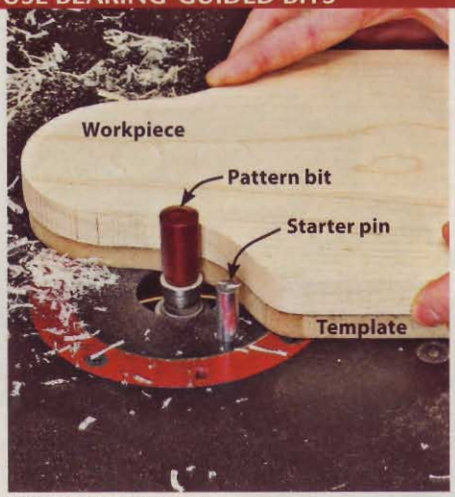
continued on page 28



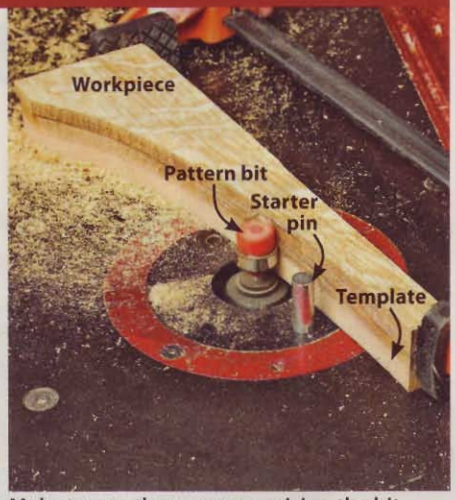
You can rout workpieces with the help of templates in one of two ways. A bearing-guided bit, at *left*, trims the workpiece flush with the template. A guide bushing, at *right*, rides along the template edge and requires a template sized either larger (for inside cutouts) or smaller (for outside edges) than the workpiece. Although guide bushings work with lower-cost straight bits, we prefer the convenience of working with bearing-piloted bits and templates that match the workpiece in size and shape.

DO THE JOB QUICKLY WITH EASY-TO-USE BEARING-GUIDED BITS

Using a flush-trim bit on a router table allows you to better see the larger workpiece because the smaller template rides on top.



With the bearing riding along the template edge, steadily feed the workpiece into the bit to avoid burning.



Make two or three passes, raising the bit height each time, if your pattern bit's cutter is shorter than your workpiece thickness.

router on, anchor the workpiece against the starter pin, and slowly ease it into the bit until the bearing contacts the template. Rout in a right-to-left or counterclockwise motion for edge trimming, as shown *above left*; use a left-to-right or clockwise motion for inside cutouts. Once you've begun cutting with the bit, pull your workpiece away from the starter pin.

A pattern bit works similarly to a flush-trim bit, except you flip the workpiece so the template rides against the router table top, as shown *above center* and *above right*, or the router subbase. Work in the same manner with these on your router table. With a handheld router you need to elevate your workpiece, which will be on the bottom, with blocks to avoid cutting into your workbench.

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Faux Finishes

Dress up bargain materials with these distinctive looks.

Watch a FREE 5-minute video on Faux Finishes at: woodmagazine.com/videos.

Hollywood filmmakers use fakery to wow their audiences, often because it's cheaper to make an Old West facade than to build an actual town. That's the same principle behind these three finishing techniques that turn unglamorous materials, such as poplar or MDF, into eye-catching works of art. And because they require only a few inexpensive ingredients, you don't need Steven Spielberg's production budget to get these looks:

- **Crackle:** This classic country look uses two colors of paint and a special transparent "crackle" coat between them to mimic an old, sun-battered surface.
- **Pewter:** Spray paint makes it easy to create a pewter look for this crown molding box from *WOOD®* magazine issue 104 (March 1998). Download plans for this box and others at woodmagazine.com/cmbox. Other metallic finishes include aged bronze, brass, and gold.
- **Leather:** Unlimited color combinations let you adapt this finish to any room decor.

We'll show you how to create each finish shown *above*. We found it easier to apply crackle and leather finishes to parts before assembly, as shown at *left*.

Tape off joint surfaces before you prime and paint project parts.

For all finishes and materials, first sand to 220 grit. Before finishing MDF, apply a coat of glue size as described *below*, and sand again with 220 grit. Apply your choice of primer and sand once more at 220 grit for a smooth surface.

For smooth MDF, start with size

Before you prime and paint MDF, you need to seal its porous surface. First, sand it to 220 grit, and then vacuum or blow away sanding dust. In a glass or plastic container, stir seven parts yellow glue into three parts water to create a glue size. Using a disposable foam brush, apply a generous coat of glue size to the faces, edges, and ends of each MDF piece. Avoid nicking the MDF surfaces while they're moist, and allow the glue size at least two hours to dry before sanding it smooth.

continued on page 34

Create crackle in a snap

Base coat over primer | Top coat over crackle coat | Wash coat

With just a few minutes work, you'll have a classic faux finish that resembles decades of paint build-up.

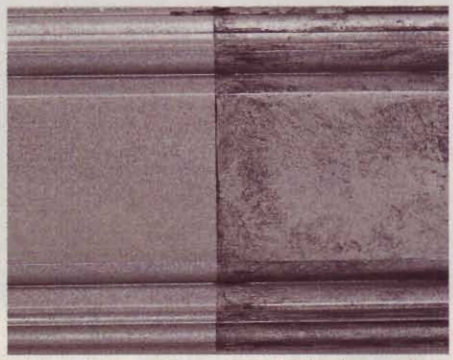
Ingredients

We used Behr midnight dream (No. 570F-7) base coat, and castle stone (No. 360E-2) top coat water-based paint (both $9.50 per quart), and Behr Crackle ($14 per quart). All are available at The Home Depot, homedepot.com.

Step by step

1. Start with the sides and ends of the box assembled but not attached to the base or top. This lets you paint most of the project using a mini roller, which applies base coats more evenly than a brush. Cut the hinge mortises slightly wider than necessary to accommodate the paint.
2. On the primed surface, brush or roll on two coats of a base color that will show through the cracks. Dark colors may need additional coats. Allow the last layer to dry overnight. Use brushes to fill in corners where rollers can't reach.
3. Brush or roll on a coat of crackle, and allow it to dry for at least two hours.
4. Apply a single top coat using a mini roller. The crackle effect begins immediately as you apply the topcoat, so avoid going over previously painted areas and accidentally filling in the cracks. Allow it to dry overnight before handling.
5. To age the finish, mix 1 tablespoon of any medium-brown latex paint into 10 tablespoons of satin water-based finish, and mix thoroughly. Brush on an even wash coat without overlapping the strokes. Remove any drips or runs using a dry towel, but allow some of the wash coat to build up in grooves and corners.

Produce the look of aged pewter



Silver base coat | Antiquing coat

Ingredients

The American Accents *Antique Pewter finishing kit* ($11; Rust-Oleum, 800-481-4785 or rustoleum.com) includes a silver metallic aerosol base coat, antique top coat, and applicator tools. You'll also need several dampened soft rags.

Step by step

1. Spray on two coats of aerosol primer to avoid brush marks. (We used BIN Primer-Sealer, Zinsser, 732-469-8100 or zinsser.com.) Sand the final coat smooth with 220-grit abrasive.
2. Spray on three coats of metallic silver finish. Lightly sand between coats using the kit's abrasive pad. Unlike the other two finishes, which can mask minor woodworking imperfections, the spray metallic finish will highlight them. Hold your workpiece up to an angled light and look for shadows that signal flaws. Sand the final base coat to remove dust nibs and dull the shiny silver surface for the satin sheen of pewter.
3. To dab on the antiquing color, you can use the sponge brush that comes with the kit. But we had better luck using damp cotton rags to wipe on the antiquing color. This finish dries extremely fast, so limit yourself to small areas at a time. For example, we antiqued the top of the box lid, shown at *left* in five parts.
4. Wipe off the excess. Using a clean, damp soft cloth or paper towel, quickly dab off the excess antiquing coat, leaving small, random patches on the flat surfaces and deposits in the routed profiles. Antiquing takes effort to remove, so when in doubt, apply and wipe off two light coats instead of one heavy coat.

continued on page 36

Easy-to-Build Summer Seating

Garden Bench Plan
DP-00362 $5.95

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Apply a luxury leather look

Ingredients

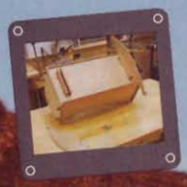
We used a base coat of Ralph Lauren poplar island latex paint (NA23, $30 per gallon, or substitute a Glidden Evermore satin base, $9 per quart) with Ralph Lauren natural khaki (AL02, $10.50 per quart) water-based glaze. Find all at The Home Depot. Wad up any plastic bags that hold a crease; then cut them into pieces large enough to cover the parts you're finishing.

Lift off the crinkled plastic shopping bag to reveal a random pattern resembling leather.

Step by step

1. Tape the joint surfaces of each piece before priming and finishing. To compensate for the small amount of finish overlapping the joint surfaces, cut dadoes and rabbets a hair wider.
2. Use a mini roller to apply two layers of base coat to the primed individual pieces. Unlike most brushes, these mini rollers leave an even surface for the glaze coating. To snag any drips, do the edges before painting the flat surfaces. Allow the last base coat to dry overnight before proceeding.
3. Using a foam brush, apply glaze in diagonal strokes. Immediately after applying the glaze, cover it with a piece of crinkled plastic shopping bag. Press the plastic evenly atop the glaze, but not hard enough to squeeze it off the base coat. Remove any bubbles, but leave any creases and folds in the plastic.
4. Slowly lift the plastic off the surface, and check the pattern for spots you missed. Dab these with a section of the plastic still partially covered with glaze. If you want a shade closer to the glaze color, repeat steps 3 and 4 after allowing the first glaze coat to dry at least four hours.
5. Allow the paint to dry thoroughly before assembly. Tape or clamps can lift off a freshly applied glaze coat, even after it's dry to the touch. Use light clamping pressure, and cover the clamp faces with painter's tape to keep them from sticking to the glaze.
6. After assembly, apply a coat of medium-brown wax or brown shoe polish to introduce a second color, help fill small gaps, and control the surface sheen. After the wax or polish starts to haze, buff it with a soft cloth.

Base coat over primer | Glaze coat | Brown shoe polish



See a slide show of this project coming together at woodmagazine.com/slides

Rockin' Knockdown Heirloom Cradle

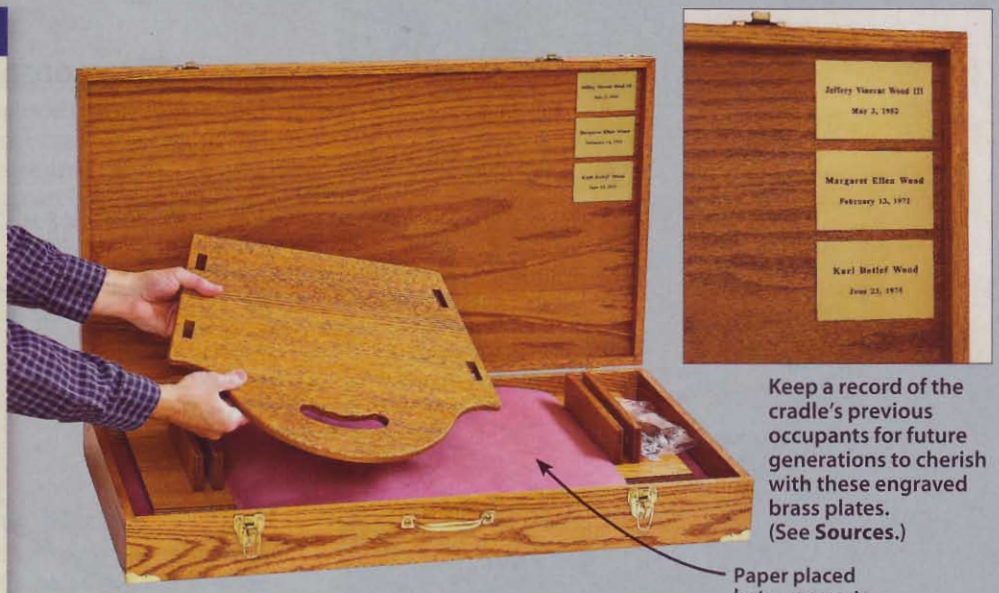
Gently lull a newborn into sweet slumber with this beautiful and cozy cradle.

PROJECT HIGHLIGHTS

- Overall dimensions: Cradle—31" long × 24½" wide × 21¼" high; storage box—32⅛" long × 17⅝" wide × 4¾" high.
- Materials needed: Red oak (we used riftsawn), red oak plywood, and a small piece of walnut.
- Full-size patterns make it a snap to shape the ends (A), sides (B), rockers (E), and wedges (G), plus form the mortises and tenons.
- The unique design of this virtually glue-free project comes from Neil Lamens of Brookhaven, N.Y. His crib was a winner in the *WOOD®* magazine Build-A-Gift Contest. (See issue 175, March 2007.)

Skill Builders

- Learn an easy way to form a stopped groove using fillers.
- Discover a simple technique for forming an angled wedge mortise.



For traveling or storage, protect the cradle in this simple-to-make companion box.

Keep a record of the cradle's previous occupants for future generations to cherish with these engraved brass plates. (See Sources.)

Let's start with the ends and sides

1 From edge-joined ½"-thick stock, cut two 17"-wide × 18"-long blanks for the ends (A), and two 11"-wide × 31"-long blanks for the sides (B). (To ensure flat parts, we planed ¾" stock to ½".) Set the blanks for the sides aside.

2 Make four copies each of the full-size half-patterns for the ends (A) and full-size end and corner patterns for the sides (B) from the *WOOD Patterns®* insert. Make two copies of the full-size half-pattern for the rockers (E), and eight copies of the pattern for the wedge (G). Set all of the patterns aside except for the half-patterns for the ends.

3 Tape together two copies of the end half-patterns for each end (A), joining the patterns along the indicated lines. Note that because the right- and left-side pattern halves are overlaid, it does not matter which way you position the copies. Highlight the shape of each part [**Drawing 1**, *next page*] on the patterns, and trim them [**Photo A**]. Now spray-adhere the patterns to the *outside* (best) face of the end blanks, aligned with the bottom edges and centered side-to-side.

4 Using your table-mounted router fitted with a ½" straight bit, rout a ¼"-deep groove ½" from the *bottom* edge of each end blank on the *inside* face [**Drawing 1**]. Then, to position the filler blanks (C) to form 12¾"-long stopped grooves, use a square to transfer lines from the locations for the *inside* ends of the fillers, where shown on the patterns. Verify that the lines are exactly 12¾" apart.

5 To form the filler blanks (C), cut a ½×12" piece from stock planed to ¼" thick to fit snugly into the grooves in the end blanks. For the best appearance, select stock that matches the grain pattern and color of the end blanks. Crosscut four 2"-long blanks from the strip. Now glue the blanks into the groove in each end blank and aligned with the lines [**Photo B**], noting that you'll have some exposed groove at each end until you bandsaw the end blanks to shape later. After the glue cures, sand the fillers flush with the end blanks.

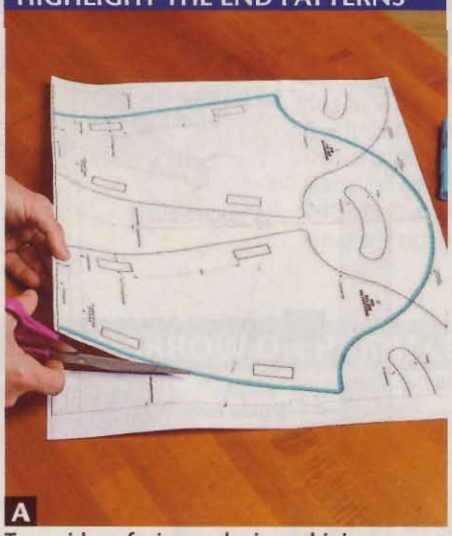
6 Bandsaw and sand the end blanks (A/C) to shape, following the highlighted pattern lines.

7 To form the curved hand openings, bore 1" holes through the ends (A/C), where shown on the patterns, using a Forstner bit and a backer to prevent tear-out. Then scrollsaw and drum-sand to the pattern lines to complete the openings. (We used a ¾"-diameter, 120-grit sanding drum.)

8 Form the ½×1½" through mortises in the ends (A/C), where shown on the patterns, to receive the tenons on the sides (B) [**Drawing 1**]. To do this, drill a ⅛" blade start hole through the waste area of each mortise close to the pattern lines. Then scrollsaw out the mortises [**Photo C**, *next page*]. Insert a corner of a side into each mortise to verify the correct mortise width.

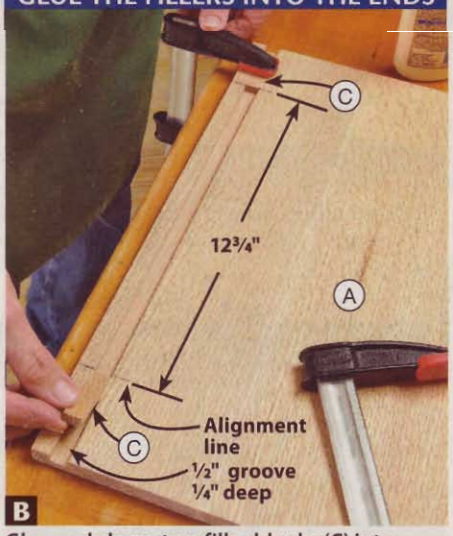
9 Rout ⅛" round-overs along the outside edges of the ends (A/C) and the hand openings on both sides. Now remove the patterns, and sand the ends to 220 grit.

HIGHLIGHT THE END PATTERNS

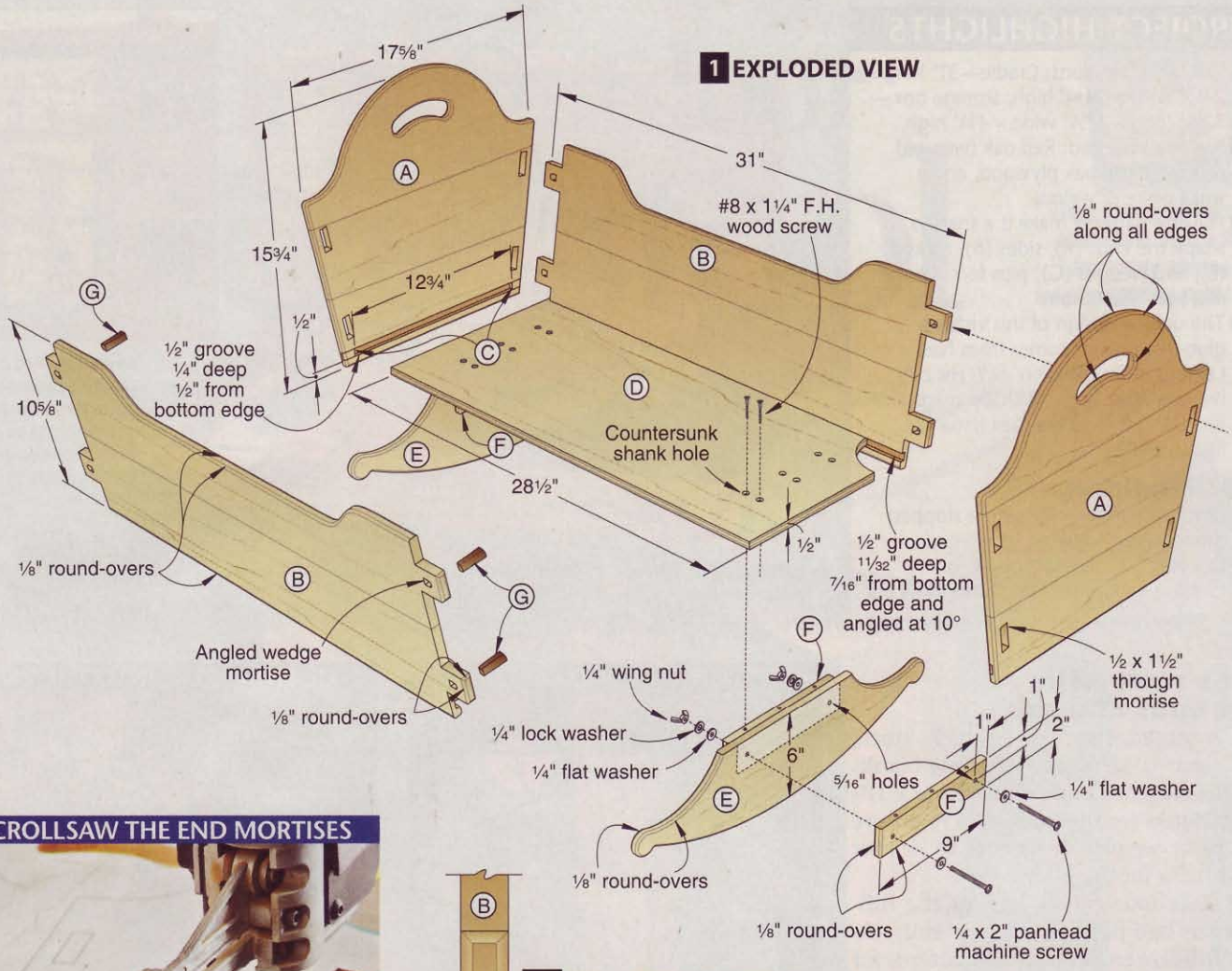


To avoid confusion and mismachining, highlight the shape of the end (A) on each pattern. Trim to within ½" of the outline.

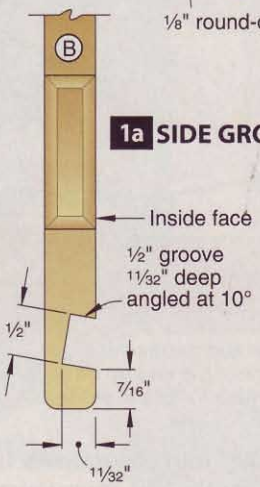
GLUE THE FILLERS INTO THE ENDS

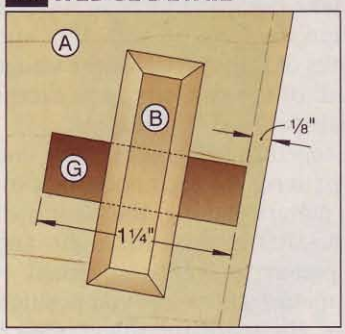


Glue and clamp two filler blanks (C) into the groove in each blank for the ends (A), aligning the fillers with the marked lines.



Scrollsaw each mortise to shape, carefully cutting *along* (and *removing*) the pattern lines to ensure a good fit with the tenons.





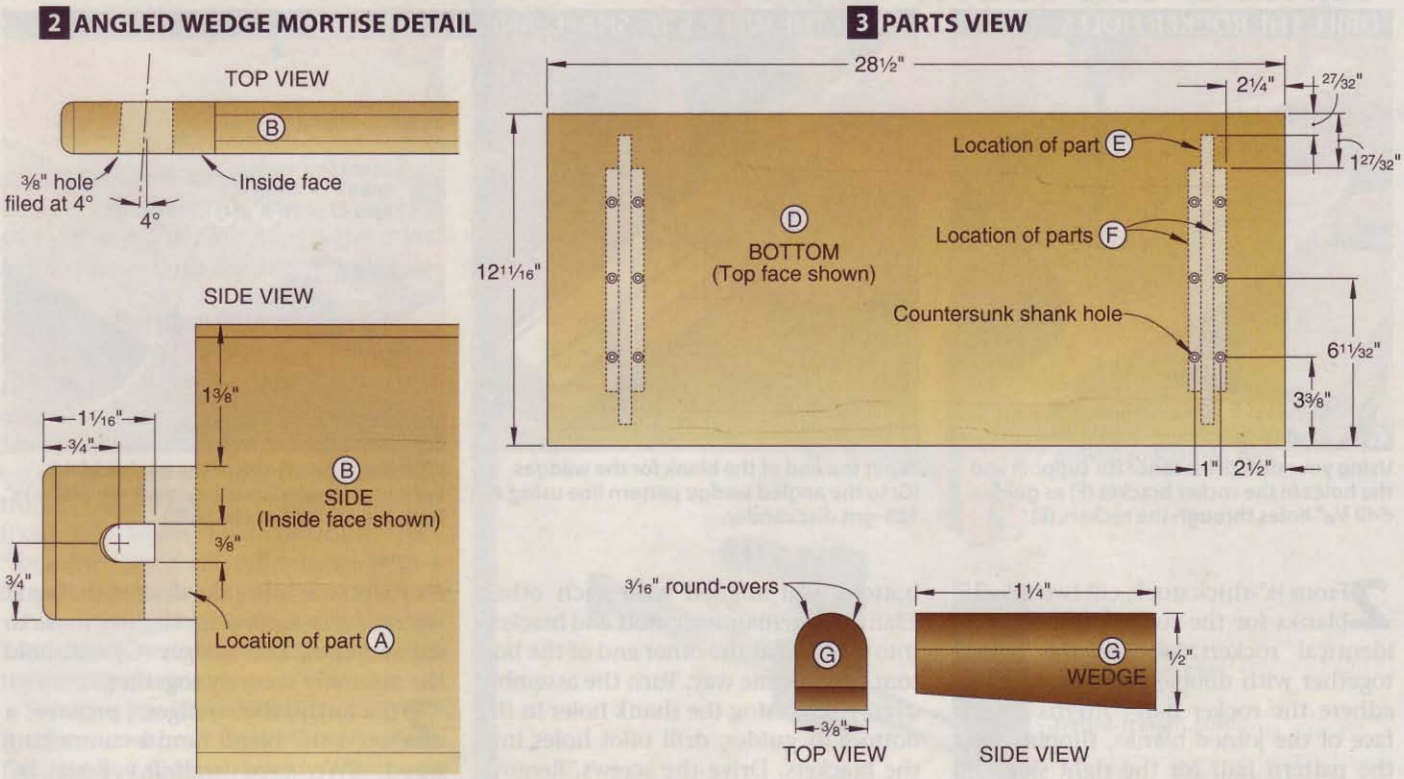
Form the tenons and mortises in the sides

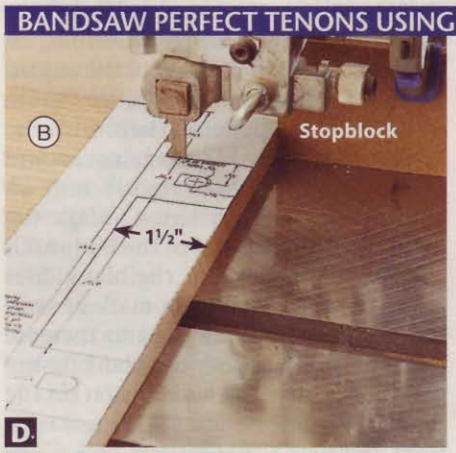
1 Spray-adhere the end patterns that you set aside earlier to each end of the 11×31" blanks for the sides (B) on the *inside* faces. After completing the sides, you'll rip them to the finished width of 10⅝", leaving the top tenons 1⅜" from the edges [**Drawing 2**], and the bottom tenons 1¾" from the edges.

2 To form the tenons, bandsaw along the cheeks to the shoulders, cutting *to* the pattern lines and *leaving* the lines. Use a fence and a stopblock to ensure straight and identical 1½"-deep cuts [**Photo D**]. After making the first cut, flip the blank end-for-end (pattern-side down with the same edge against the fence), and cut again. (This is a blind cut, controlled by the fence and stopblock.) Repeat for the other blank. Then reposition the fence as needed, and repeat the process to make the remaining cheek cuts in the blanks.

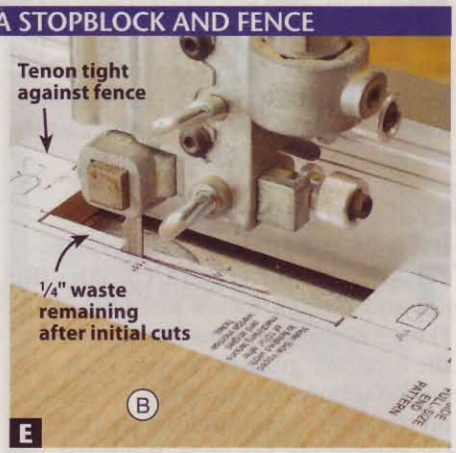
3 To complete the tenons, remove the fence, and bandsaw the waste from *between* the tenons at each end of the blanks, cutting to approximately ¼" from the shoulder pattern lines. (Removing most of the waste makes it easy to bandsaw straight along the lines during the final cuts, using the fence as a guide.) Reposition the fence and stopblock, and make the 1¾"-deep *outside* shoulder cuts, again using the cut-and-flip technique. *Without moving the fence*, remove the remaining waste from between the tenons to the shoulder pattern lines [**Photo E**], making two cuts and flipping the blanks edge-for-edge.

4 To form the angled wedge mortise in each tenon [**Drawing 2**], drill a ⅜" hole through the tenons, where shown on the patterns, using a brad-point bit and a backer to prevent tear-out. Next, scrollsaw the mortises to shape, cutting *along* (and *removing*) the pattern lines at the *sides* and *square* end. Then, to angle

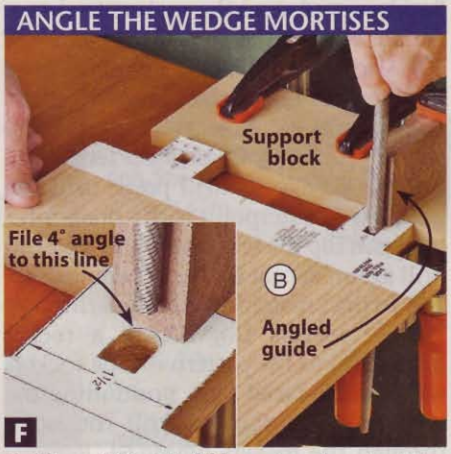




Using a stopblock, bandsaw 1½"-deep cuts *to* the pattern lines (*leaving* the lines) to form the tenon cheeks in the sides (B).



To make the final cuts along the shoulder between the tenons, press the blank against the fence to ease the blade into the waste.



Holding a 3/8" rat-tail file centered against the 4° angled end on a guide, taper the round end of each mortise in the sides (B).

each mortise at the round end, miter-cut one end of a ¾×2×6" scrap at 4° for a guide. Clamp the guide, centered and aligned with the remaining pattern line at the round end of the mortise, to a support block [**Photo F**]. Using a ⅜" rat-tail file and the guide, as shown, taper the hole to the pattern line with a couple of light strokes.

5 Using a dado blade in your tablesaw, cut a ½" groove 11/32" deep 7/16" from the *bottom* edge and angled at 10° in each side (B) on the *inside* face [**Drawings 1** and **1a**] to receive the bottom (D).

6 Rip ⅜" from the *top* edges of the sides (B) for a finished width of 10⅝".

7 Remove the end patterns from the sides. Then spray-adhere the corner patterns in position, aligned with the *top* edges and *shoulders* (not *ends*) of the tenons. (You'll need to flip the patterns over at the right ends.) Draw lines to connect the patterns. Now bandsaw and sand the sides to shape, saving the cutoffs for use as spacers for the rockers (E) during assembly.

8 Rout ⅛" round-overs along the top and bottom edges of the sides and *long* edges at the *ends* of the tenons [**Drawing 1**]. Using a 150-grit sanding block, round over the *short* edges at the *ends* of the tenons to blend with the routed round-overs. Then ease the sharp edges along the cheeks of the tenons by hand-sanding. Remove the corner patterns, and sand the sides smooth.

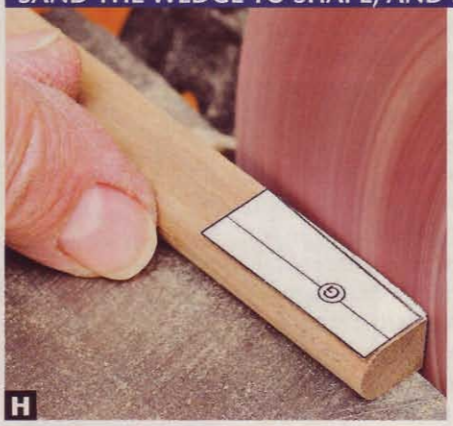
Move on to the bottom, rockers, and brackets

1 Cut the plywood bottom (D) to the size listed [**Materials List**, *page 44*]. Mark centerpoints for countersunk shank holes on the *top* face of the bottom for attaching the rocker brackets (F) [**Drawing 3**]. Drill the holes. (For the #8 screws in this project, drill countersunk 5/32" shank holes and 7/64" pilot holes.) Sand the bottom.

DRILL THE ROCKER HOLES

Using your drill-press fence for support and the holes in the rocker bracket (F) as guides, drill 5/16" holes through the rockers (E).

SAND THE WEDGE TO SHAPE, AND FIT AND MARK IT



Taper the end of the blank for the wedges (G) to the angled wedge pattern line using a 120-grit disc sander.

With the tapered end of the wedge blank tight in an angled mortise, mark the blank 1/8" from the end of the end (A/C).

2 From ½"-thick stock, cut two 6¼×25" blanks for the rockers (E). To form identical rockers, adhere the blanks together with double-faced tape. Spray-adhere the rocker half-patterns to one face of the joined blanks, flipping over the pattern half for the right side and joining the patterns where shown. Bandsaw and sand the rockers to shape. Do not remove the patterns.

3 Also from ½" stock, cut the rocker brackets (F) to size. Mark a centerpoint for a 5/16" hole at one end of a bracket [**Drawing 1**]. Using a fence and stopblock on your drill press, drill the hole at the centerpoint with a brad-point bit. Then flip the bracket end-for-end and drill again. Repeat for the other brackets.

4 To drill matching 5/16" holes through the rockers (E), adhere a rocker bracket (F) to the pattern on the rockers with double-faced tape, positioning the bracket where shown. Drill the holes through the rockers [**Photo G**]. Remove the bracket, separate the rockers, and remove the tape and patterns.

5 Rout ⅛" round-overs along the curved edges of the rockers (E) [**Drawing 1**]. Sand the parts smooth.

6 To mount the rocker brackets (F) to the bottom (D) [**Drawings 1** and **3**], position the bottom on your workbench with the *bottom* face up and one end overhanging the benchtop approximately 4". On this end, clamp one of the ½"-thick cutoffs from the sides (B) on edge to the bottom, centering the cutoff between the six mounting holes. To ensure easy removal of the rockers (E) from between the brackets whenever you knock down the cradle, see the **Shop Tip**, *right*.

Next, clamp two rocker brackets to the spacer, centered end to end on the bottom and aligned with each other. Clamp the remaining cutoff and brackets into position at the other end of the bottom in the same way. Turn the assembly over. Then, using the shank holes in the bottom as guides, drill pilot holes into the brackets. Drive the screws. Remove the clamps and spacers.

7 Slide the rockers (E) into position between the rocker brackets (F), with the 5/16" holes in the parts aligned. Secure the rockers with the panhead machine screws, flat washers, lock washers, and wing nuts [**Drawing 1**].

Craft the wedges to fit into the angled mortises

1 Assemble the ends (A/C), sides (B), and bottom/rocker assembly (D/E/F) together, with the bottom captured in the stopped grooves in the ends and angled grooves in the sides. The tenons on the sides should slide easily through the mortises in the ends. If needed, use a flat file to remove material from the mortises to achieve the desired fit. Don't worry if any tenons are slightly loose in the mortises. The wedges (G) will hold the assembly securely together.

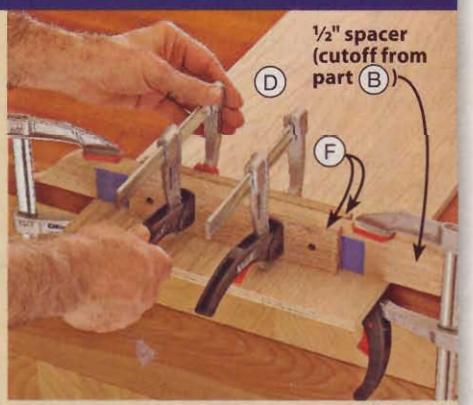
2 To form the wedges, prepare a ⅜×1½×16" blank from a contrasting wood. (We used walnut.) Rout 3/16" round-overs along one edge of the blank [**Drawing 3**]. Rip the blank to ½" wide.

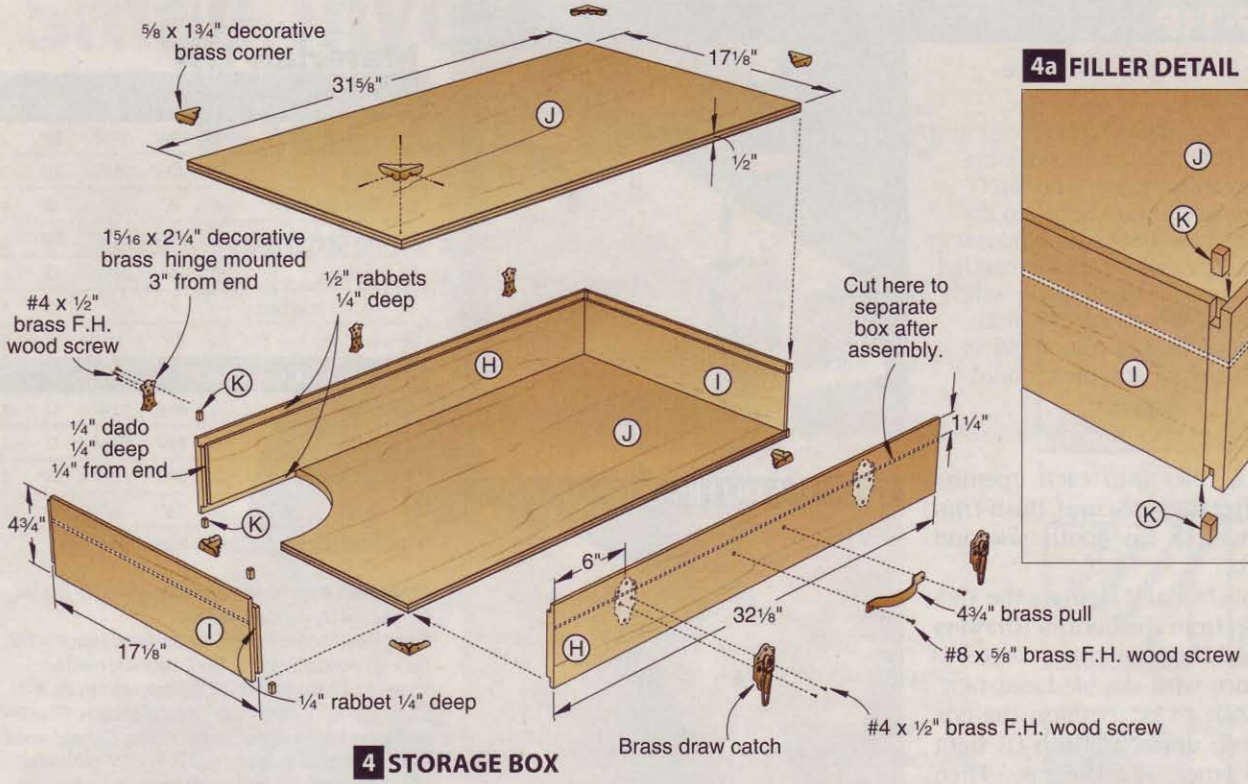
3 Spray-adhere a wedge pattern to an end of the blank. Sand to the angled pattern line to shape the wedge [**Photo H**]. Remove the pattern. Then, with the angled edge of the blank against an end (A/C), slide the blank tightly into an angled mortise in a tenon. Mark the blank ⅛" from the end of the end (A/C) [**Drawing 1b**, **Photo I**]. If the blank does not extend far enough to mark it, sand the angled edge as needed to increase the extension. Remove the blank. Using your tablesaw with an extension on the miter gauge, crosscut a 1¼"-long wedge from the blank. Repeat the process to make seven more wedges. Sand smooth.

SHOP TIP

A simple way to shim parts for easy disassembly

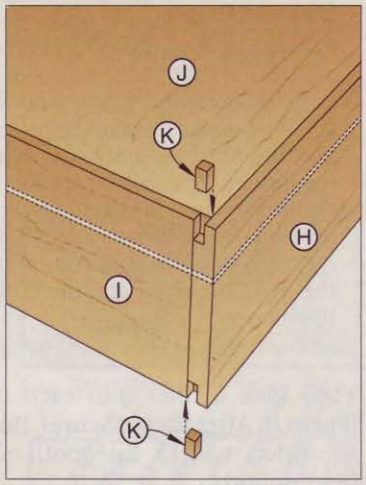
To make sure that tight-fitting parts, such as the rockers (E) between the rocker brackets (F), remove easily when disassembling a project, use masking tape for a shim to provide a small clearance between the parts during assembly. For example, when mounting the rocker brackets to the cradle bottom (D), apply a piece of tape to each face of the ½" spacer (used in place of the rocker for clamping ease), and then clamp the brackets to the spacer. The two pieces of tape provide a total clearance of approximately .010"—just enough so that the rockers are not loose but will slide out easily.





4 STORAGE BOX

4a FILLER DETAIL

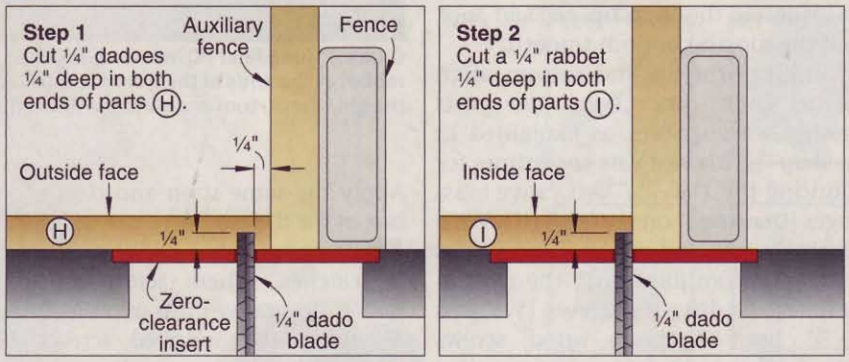


Wrap things up with a baby-smooth finish

1 Disassemble the cradle and remove the rockers (E). Finish-sand to 220 grit any areas that need it, and remove the dust.

2 Apply a stain and clear finish. (We applied Varathane no. 218 Traditional Pecan Stain followed by three coats of AquaZar Water-Based Clear Satin Polyurethane, sanding to 320 grit between coats.) Finally, add a mattress (see **Sources**), linens, and blankie. Then introduce a newborn to a comfy home.

5 CUTTING THE BOX CORNER JOINT



SHOP TIP

Use stabilizer blocks to safely separate a box

When ripping a box, such as the cradle storage box, to separate the top and bottom, you need to prevent the parts from moving and pinching the blade when you make the final two cuts. Here's an easy way to do it. After ripping the sides (or ends) of the box, adhere suitably sized stabilizer blocks from ½" scrap to the sides with double-faced tape, as shown, to hold the top and bottom in position and the kerfs open. Then rip the front and back to detach the top. To prevent interference between the blocks and fence, make the blocks ¼" shorter than the width of the sides (4½"-wide blocks for the cradle storage box), and center the blocks on the sides.

Make the optional storage box

1 Cut the front/back (H), sides (I), and plywood top/bottom (J) to the sizes listed. Using a dado blade in your tablesaw, cut the dadoes in the front/back and rabbets in the sides [**Drawings 4** and **5**]. Then cut a ½" rabbet ¼" deep along the top and bottom edges of the front/back and sides on the *inside* faces to receive the top/bottom.

2 Dry-assemble the front/back, sides, and top/bottom together, and check for correct fit. Then glue and clamp the parts together.

3 To fill in the exposed rabbets at the ends of the front/back (H), cut a ¼×½×12" blank for the fillers (K). Crosscut eight 1"-long fillers from the blank.

SHOP TIP

How to prevent a hinge-bound top

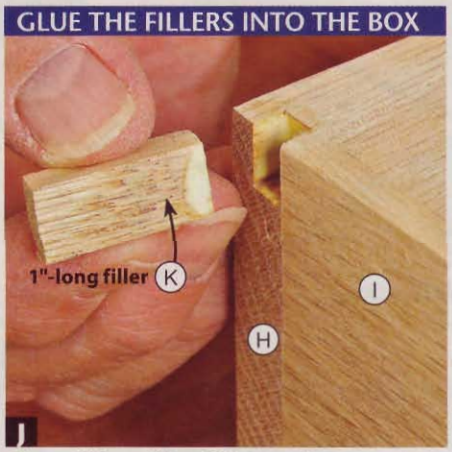
Ever hinge-mounted a top to a box and discovered that the top did not close flush? This can happen if you don't allow a tiny bit of space between the box and lid at the back when mounting the hinges. To easily create the needed clearance, insert business cards, which measure approximately .015" thick, between the top and bottom, clamp the parts together, and then mount the hinges.

Then glue a filler into each opening [**Photo J**]. After the glue cures, flush-trim the fillers with a fine-tooth saw and sand smooth.

4 To rip the box and separate the 1¼"-thick top from the bottom [**Drawing 4**], attach a 12"-tall auxiliary fence to your rip fence with double-faced tape. Raise the blade to ⅝". Position the box with a side (I) down and top (J) tight against the fence. Rip the side. Then rotate the box end-for-end and rip the other side. To safely rip the front/back (H) to separate the top without pinching the blade, see the **Shop Tip**, *previous page*. Sand the top and bottom smooth.

5 To hinge the top and bottom, align the grain and clamp the parts together with spacers, as explained in the **Shop Tip**, *above*. Draw centerlines for mounting the 1⁵⁄₁₆×2¼" decorative brass hinges [**Drawing 4**] on the back (H). With the hinges centered on the marked lines and top/bottom joint, drill the mounting holes and drive the screws. (We used #4×½" brass flathead wood screws instead of the #4×⅝" screws supplied with the hinges so that the screws did not go through the ½"-thick back.)

6 Screw-mount the brass draw catches to the front (H), where dimensioned, again using #4×½" brass flathead wood screws instead of the supplied screws. Then, remove the hinges and catches.



Glue a 1"-long filler (K) into each exposed rabbet at the ends of the front/back (H). After the glue cures, trim and sand the fillers flush.

Apply the same stain and finish to the box as for the cradle.

7 Remount the hinges and draw catches. Then screw-mount the ⅝×1¾" decorative brass corners [**Drawing 4**], using the supplied screws. Now mount the 4¾" brass pull, centered, to the front (H) using #8×⅝" brass flathead wood screws (not the ¾"-long screws supplied with the pull).

Written by **Owen Duvall** with **Chuck Hedlund**
Project design: **Neil Lamens,** Brookhaven, NY, with **Kevin Boyle**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

Materials List

Heirloom cradle		FINISHED SIZE T	W	L	Matl.	Qty.
A*	ends	½"	15¾"	17⅝"	EO	2
B*	sides	½"	10⅝"	31"	EO	2
C	filler blanks	¼"	½"	2"	O	4
D	bottom	½"	12¹¹⁄₁₆"	28½"	OP	1
E*	rockers	½"	6"	24½"	O	2
F	rocker brackets	½"	2"	9"	O	4
G*	wedges	⅜"	½"	1¼"	W	8
Storage box (optional)						
H	front/back	½"	4¾"	32⅛"	O	2
I	sides	½"	4¾"	17⅛"	O	2
J	top/bottom	½"	17⅛"	31⅝"	OP	2
K*	fillers	¼"	¼"	½"	O	8

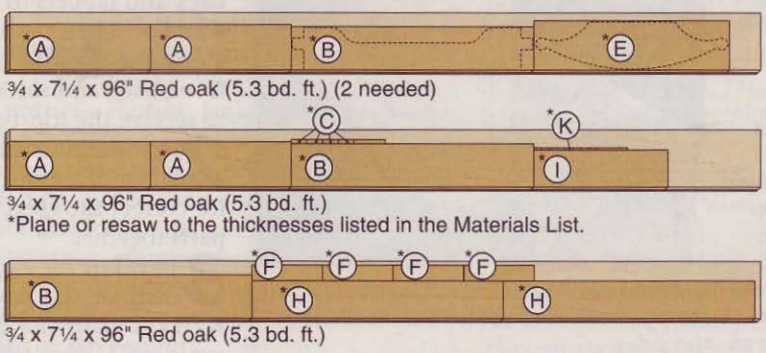
*Parts initially cut oversize. See the instructions.

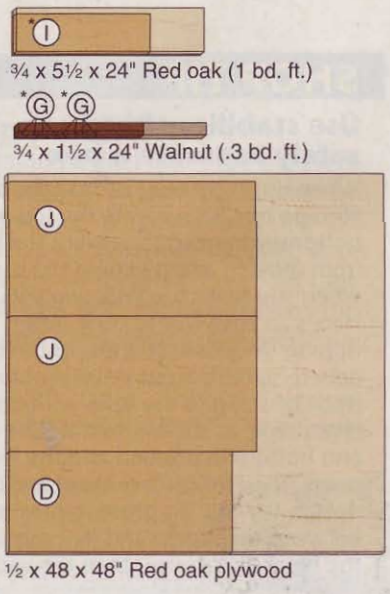
Materials key: EO–edge-joined red oak, O–red oak, OP–red oak plywood, W–walnut.
Supplies: Spray adhesive, double-faced tape, #8×1¼" flathead wood screws (12), ¼×2" panhead machine screws (4), ¼" flat washers (8), ¼" lock washers (4), and ¼" wing nuts (4). For the optional storage box: 1⁵⁄₁₆×2¼" decorative brass hinges (3), #4×½" brass flathead wood screws (30), brass draw catches (2), ⅝×1¾" decorative brass corners (8), 4¾" brass pull, #8×⅝" brass flathead wood screws (2).
Blade and bits: ½" straight and ⅛" and ³⁄₁₆" round-over router bits, 1" Forstner bit, ⅜" and ⁵⁄₁₆" brad-point bits, dado-blade set.

Sources

Engraved plate: 2¼×3½" laser-engraved, adhesive-backed gold-colored plate, no. ENGOLD, $7.88 plus shipping and handling. Includes up to 40 engraved letters at no additional charge. Call or click Crown Awards; 800-227-1557, crownawards.com.
Mattress: Custom-sized 8×22" high-density, vinyl-covered foam mattress with straight (not rounded) corners, no. A002112, $40.00 plus shipping. Call or click ABaby.com; 877-552-2229, ababy.com.

Cutting Diagram





Space-Saving Double-Duty Tablesaw Workbench

Attention, small-shop and garage shop woodworkers: Here's a project designed with you in mind. It's a combination workbench and outfeed table. Plus, for the space-starved shop, it stores in the same footprint as your tablesaw.

Watch a FREE two-minute video of the Tablesaw Workbench in action at: woodmagazine.com/videos

PROJECT HIGHLIGHTS

- Overall dimensions: 61½" wide × 32⅛" deep × 39³⁄₁₆" high (casters in the down position).
- You can customize the workbench to fit any type of tablesaw. The workbench shown at *left* fits a contractor's model with a 30" fence.
- Levelers let you adjust the bench to match your tablesaw height for use as an outfeed table.
- To renew the worksurface, simply flip or replace the ¾" plywood top panel.
- For the items needed to build this project, see *page 47* You'll find the **Supplies** at hardware stores and home centers. For the casters, see **Source**.

Skill Builder

- Learn how to form large dadoes and rabbets using your tablesaw fence as a workpiece stop.

Note: *To position the workbench over your tablesaw, remove the blade guard, rip fence, and miter gauge. The bench dimensions allow 1" clearance at the top of the tablesaw and 1" clearance at each side. There is no front-to-back clearance: With the workbench positioned over the tablesaw, the back fence rail touches the inside of the upper back rail (F) [**Drawing 4**], and the back of the front fence rail rests against the front legs (C).*

Measure your tablesaw

No matter the type of tablesaw you own, or how it's accessorized, you can customize this project to fit your needs.

1 Measure your tablesaw [**Drawing 1**], and enter the dimensions in the empty brackets. (Our sample tablesaw dimensions are shown in parenthesis.) If by chance your saw dimensions match those of the sample tablesaw, stop here. Simply use the part dimensions for the sample tablesaw shown on the **Materials List** at *right bottom*.

2 For dimensions in brackets larger or smaller than the ones in parenthesis [**Drawing 1**], here's how to size the workbench to your tablesaw. (Don't let the following lengthy explanation scare you off. The process is really quite simple.)

■ Subtract the smaller *length* dimension from the larger one. Enter the difference in the **L** column under the **CALCULATE** heading on the **Materials List** for parts A, D, E, H, J, and K, and in the **W** column for part N, preceded by a plus symbol (+) for a length in brackets larger than the one in parenthesis, and a minus symbol (-) for a length in brackets smaller than the one in parenthesis.

■ Subtract the smaller *height* dimension from the larger one. Enter the difference in the **L** column under the **CALCULATE** heading for part C, and in the **W** column for part E, preceded by a plus symbol for a height in brackets larger than the one in parenthesis, and a minus symbol for a height in brackets smaller than the one in parenthesis.

■ Subtract the smaller *width* dimension from the larger one. Enter the difference in the **L** column under the **CALCULATE** heading for parts F, G, I, and N, preceded by a plus symbol for a width in brackets larger than the one in parenthesis, and a minus symbol for a width in brackets smaller than the one in parenthesis.

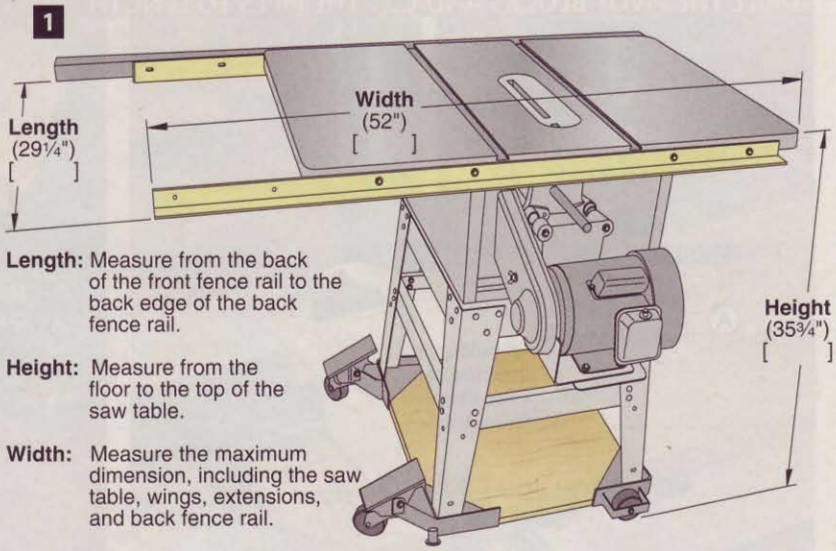
■ Divide the width dimension difference determined in the previous step by four. Record the dividend in the **L** column under the **CALCULATE** heading for parts L and M, preceded by a plus or minus symbol, as directed *above*.

■ For a *width* dimension in brackets smaller than the one in parenthesis, divide the dimension difference by two. Enter the dividend in the **L** column under the **CALCULATE** heading for part B, preceded by a minus symbol. (Do not make part B longer than the length listed for the sample tablesaw.)

■ Now add the numbers in the **W** and **L** columns under the **CALCULATE** heading to, or subtract them from, the **W** and **L** dimensions under the **SAMPLE TABLESAW** heading. Enter the new dimensions in the **W** and **L** columns under the **YOUR TABLESAW** heading. Then, to avoid confusion, cross out the obsolete **SAMPLE TABLESAW** dimensions.

Now, for example, let's say your tablesaw measures 30½" long, and you've entered this number on **Drawing 1** in the brackets under **Length**. In this case, complete the row in the **Materials List** as shown [**Example**, *right center*].

1



Length: Measure from the back of the front fence rail to the back edge of the back fence rail.

Height: Measure from the floor to the top of the saw table.

Width: Measure the maximum dimension, including the saw table, wings, extensions, and back fence rail.

Note: Our tablesaw dimensions are shown in parenthesis.

EXAMPLE:

Step 1
30½"–29¼"=1¼"

Materials List

		FINISHED SIZE: SAMPLE TABLESAW			CALCULATE		YOUR TABLESAW			
Base		T	W	L	W	L	W	L	Matl.	Qty.
A	pivot blocks	1½"	3"	~~23¾"~~		+1¼"		25"	M	2

Step 4
Cross out the obsolete dimension.

Step 2
The length in brackets is larger than the length in parenthesis.

Step 3
23¾"+1¼"=25"

Materials List

		FINISHED SIZE: SAMPLE TABLESAW			CALCULATE		YOUR TABLESAW			
Base		T	W	L	W	L	W	L	Matl.	Qty.
A	pivot blocks	1½"	3"	23¾"					LM	2
B	levers	¾"	⅞"	27½"					M	2
C*	legs	3"	3"	34½"					LP	4
D	end rails	1½"	3"	29¼"					P	4
E	end panels	¾"	23"	24"					BP	2
F	back rails	¾"	8"	60"					BP	2
G	rail stiffener	¾"	1½"	54"					M	1
Top										
H	end trim	¾"	2½"	30"					M	2
I	front/ back trim	¾"	2½"	61½"					M	2
J	top supports	¾"	1¾"	29¼"					M	3
K	end cleats	¾"	1¾"	24"					M	2
L	outer cleats	¾"	1¾"	11 7/16"					M	2
M	inner cleats	¾"	1¾"	14 7/16"					M	2
N	top panel	¾"	30"	60"					BP	1

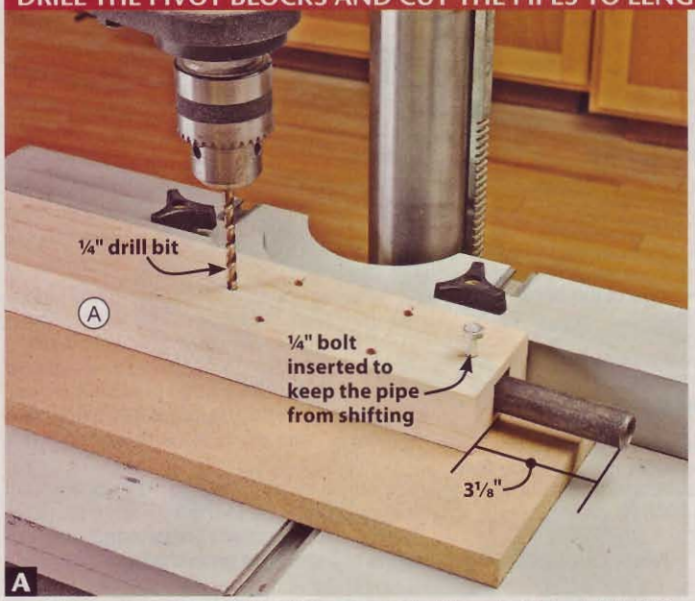
*Parts initially cut oversize. See the instructions.

Materials key: LM–laminated maple, M–maple, LP–laminated pine, P–pine, BP–birch plywood.
Supplies: #8×1¼", #8×1½", #8×2", #8×2½" flathead wood screws; ⅜" levelers with T-nuts (4); ¼×1½" hexhead bolts (6); ¼×2" hexhead bolts (24); ¼" washers (52); ¼" lock nuts (32); ¼×2" eyebolts (2); ⅞" washers (6); ⅛×¾×36" steel bar; ½×36" schedule 40 steel pipe (2).
Blades and bits: Stack dado set; ¼" round-over and 45° chamfer router bits.

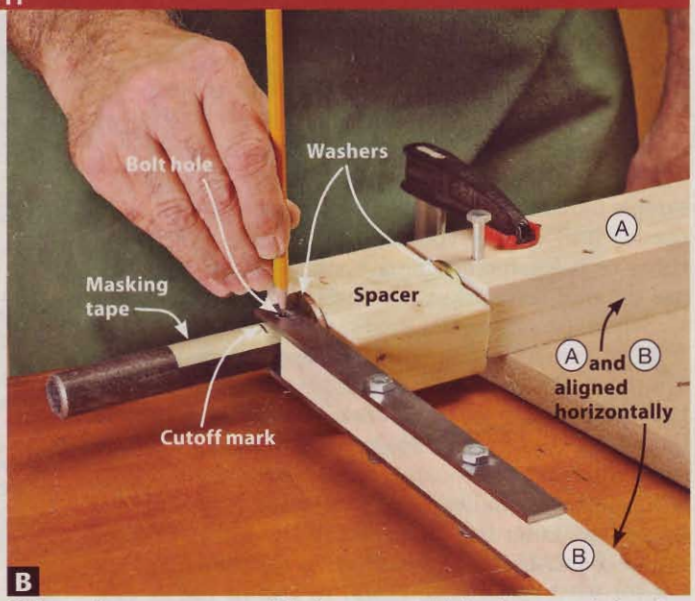
Source

Casters. 4" swivel caster with brake no. 36992, $9.99 ea. (4). Call Hartville Tool, 800-345-2396, or go to hartvilletool.com.

DRILL THE PIVOT BLOCKS AND CUT THE PIPES TO LENGTH



With 3⅛" of pipe protruding from one end of the pivot block (A), drill holes through the block and pipe at the marked hole centers.



With washers, a spacer, and the lever assembly in place, mark the pipe length and lever attachment bolt-hole location.

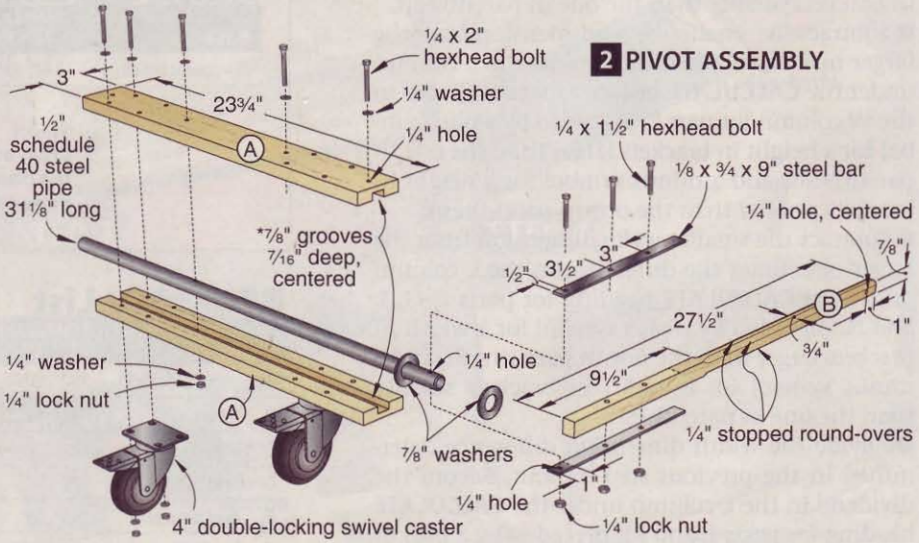
Build the pivot assemblies

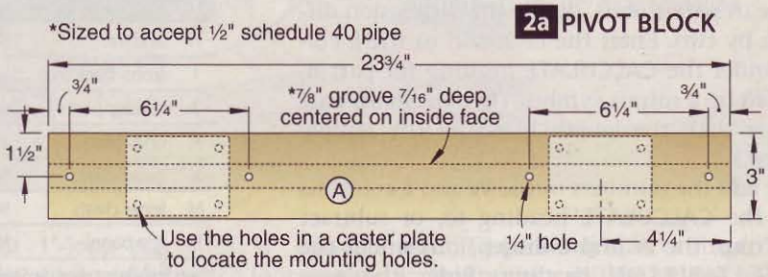
1 For the pivot blocks (A), cut four ¾"-thick pieces of stock to the width and length listed. (We used maple. If you've adjusted the length of part A, be sure to use the new length.) Then, making two passes with a dado blade, cut centered grooves in each piece [**Drawings 2** and **2a**]. Clamp the pieces together in the arrangement shown, and verify that ½" schedule 40 steel pipe slips through the square hole. Now glue and clamp the pieces, keeping the ends and edges flush.

2 Lay out the hole centers on the bottom face of each pivot block (A) [**Drawing 2a**]. (Use the caster plates to locate the caster-mounting holes.) Drill only the caster-mounting holes.

3 Cut two levers (B) to size. Rout stopped round-overs along the edges [**Drawing 2**]. Then, from a ⅛×¾×36" steel bar, cut four 9"-long pieces. Drill holes where shown. Now position a bar on each lever with the bar protruding 1" beyond the end of the lever. Using the holes in the bar as guides, mark hole positions on each lever. Also mark the hole center at the opposite end of each lever. Drill the holes on your drill press. Bolt the bars to the levers.

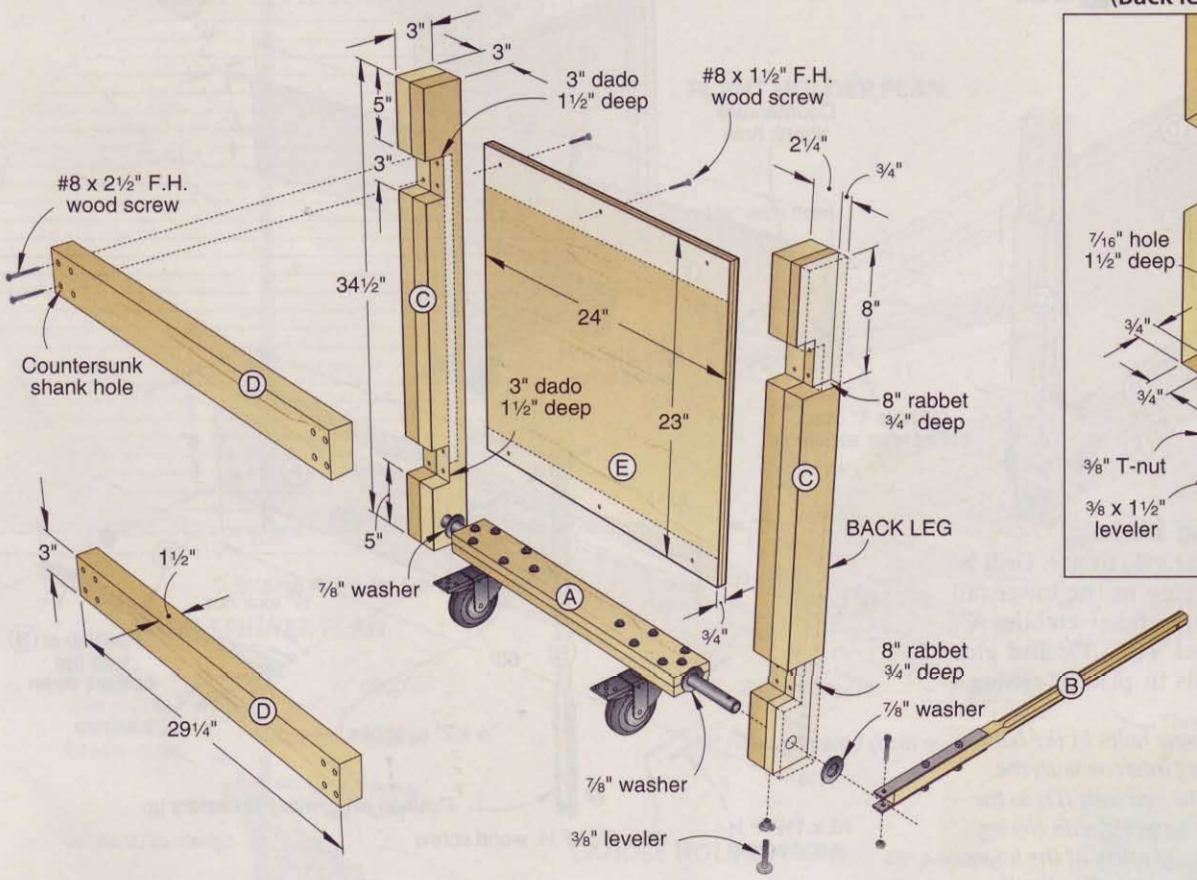
4 Slide a 36"-long piece of ½" schedule 40 steel pipe into each pivot block (A), letting the pipe protrude 3⅛" at one end. Then drill the four ¼" holes that go through both the pivot block and pipe, where previously marked [**Photo A**]. To keep the pipe from shifting in the pivot block, insert bolts into the holes as you drill them.



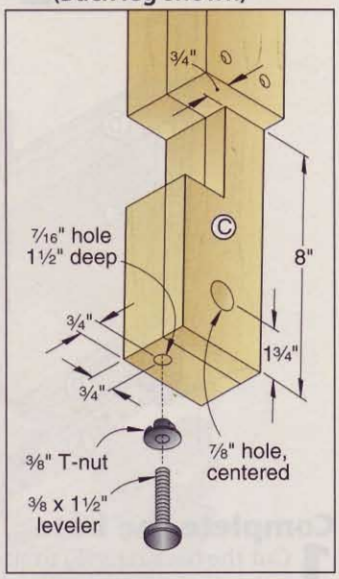


5 To cut the pipes to finished length, first cut a 3"-long spacer from 2×4 scrap. [The spacer represents the thickness of a leg (C).] Drill a centered ⅞" hole through the 3" dimension. Then slide two washers and the spacer onto the long protruding pipe end of one pivot block (A) assembly. Apply masking tape to the pipe, and with the lever (B) and pivot block aligned horizontally, mark the finished length and the bolt-hole location [**Photo B**]. Repeat with the other assembly. Now mark the pipes and pivot blocks for reassembly, remove the pipes, and cut them to length. Using a V-block on your drill press, drill the bolt holes.

3 END ASSEMBLY



3a LEVELER DETAIL
(Back leg shown)



Assemble the ends

1 For the legs (C), cut eight 2×4 pieces ½" longer than listed. Laminate them in pairs to form four 3×3½" blanks. Then joint one edge smooth, rip the opposite edge to width, and crosscut the legs to length. To avoid problems when building projects from construction lumber, see the **Shop Tip**, *below*.

2 To form 3"-wide dadoes in the inside faces of the legs (C) [**Drawing 3**], install a ¾" dado blade in your tablesaw, and adjust it to cut 1½" deep. To establish one edge of the dadoes, position the fence 5" from the *right* side of the blade, and attach an extension to the miter gauge to back the cuts. Then, using the fence as a stop, cut a dado at both ends on the inside face of each leg. Next, to establish the other edge of the dadoes, reposition the fence 8" from the *left* side of the blade. Again using the fence as a stop, cut a second dado at each end of all four legs. Now make repeat cuts to remove the waste.

3 To form the 8"-wide rabbets at the top and bottom of the back legs (C) [**Drawings 3** and **3a**], leave the tablesaw set up as in the previous step, but lower the blade to cut ¾" deep. Then, making sure you will have mirror-image parts, cut a dado at both ends of the back face of the back legs. Now make repeat cuts to remove the waste from the dadoes to the ends of the legs.

4 Drill a ⅞" hole for the pivot assembly pipes at the bottom of each leg [**Drawing 3a**]. Then drill a hole for the leveler T-nut.

5 Cut the end rails (D) to size. Glue and clamp them into the leg (C) dadoes with the rail ends flush with the front surface of the front legs and the rabbeted surface of the back legs [**Drawing 3**]. Check the assemblies for square. Then drill holes, and drive the screws. (For #8 screws in softwood, drill 5/32" shank holes and 3/32" pilot holes.)

6 Cut the end panels (E) to size. Glue and clamp the panels to the end rails (D) with the top of each panel flush with the top of the upper rail. Drill screw holes, and drive the screws.

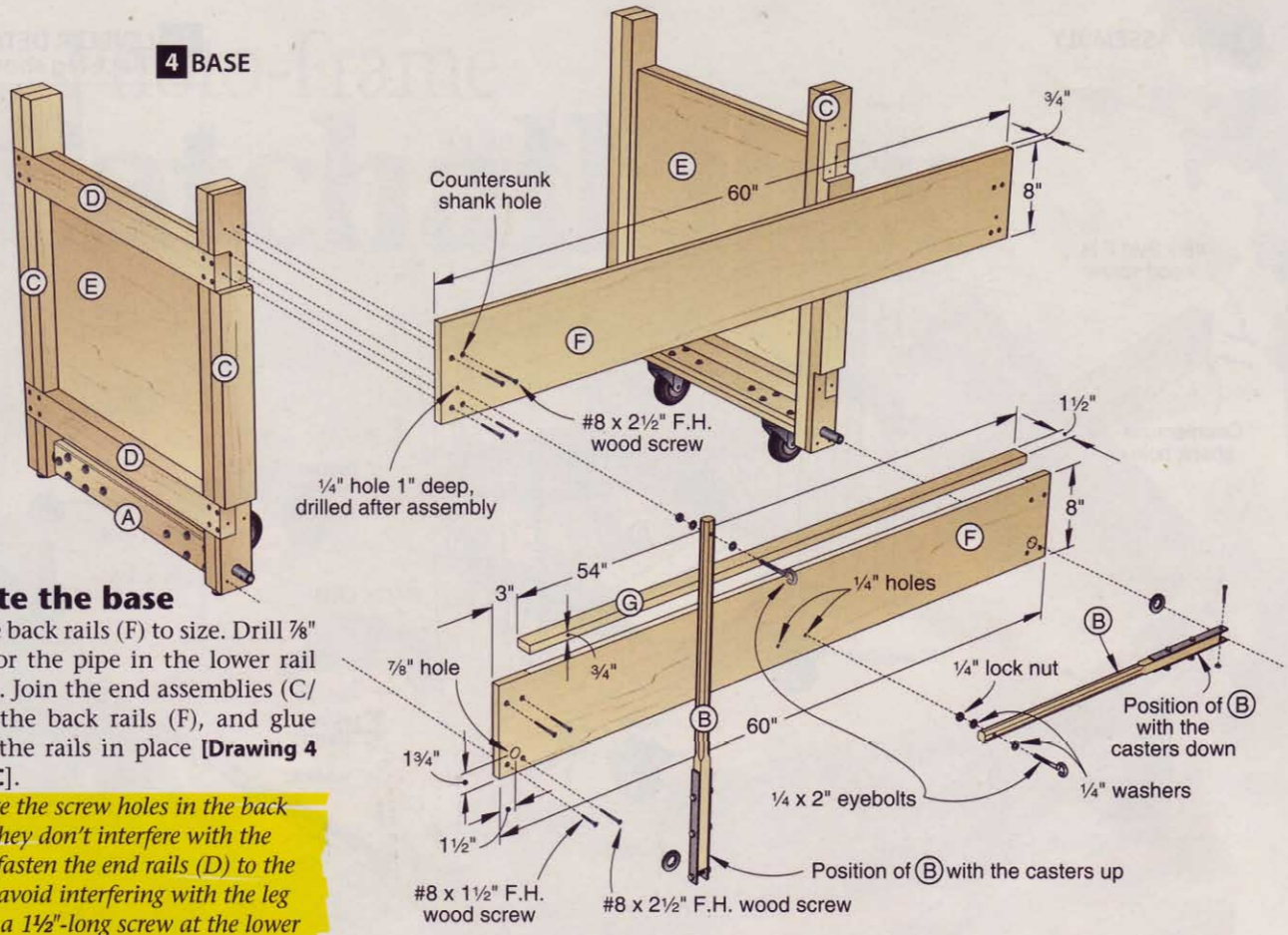
SHOP TIP

How to keep construction lumber straight

Construction lumber (2×4s, 2×6s, etc.) has a high moisture content. When brought into a shop, the lumber dries out, causing it to shrink and often twist. Of course, your project will go together easier with straight lumber. Here's a simple solution.

First, select lumber that does not include the center (pith) of the tree. Cut the parts to rough length as soon as you bring the lumber home. Then place the parts in a trash bag, as shown at *right*, and close it with a twist tie. Remove the parts for machining,

and return them to the bag until you are ready to assemble them. After building the project, the wood dries, but now twisting of any one part is restrained by the other parts.



Complete the base

1 Cut the back rails (F) to size. Drill ⅞" holes for the pipe in the lower rail [**Drawing 4**]. Join the end assemblies (C/D/E) with the back rails (F), and glue and screw the rails in place [**Drawing 4** and **Photo C**].

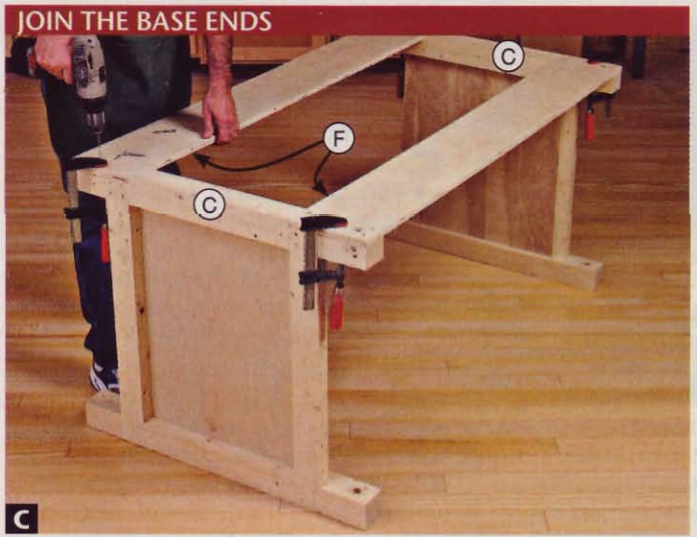
Note: *Locate the screw holes in the back rails (F) so they don't interfere with the screws that fasten the end rails (D) to the legs (C). To avoid interfering with the leg levelers, use a 1½"-long screw at the lower outside corners of the bottom back rail.*

2 Apply a finish to the pivot blocks (A) and levers (B). (For an easy-to-apply and easy-to-repair finish, we applied two coats of Minwax Antique Oil Finish.) Attach the casters to the pivot blocks [**Drawing 2**].

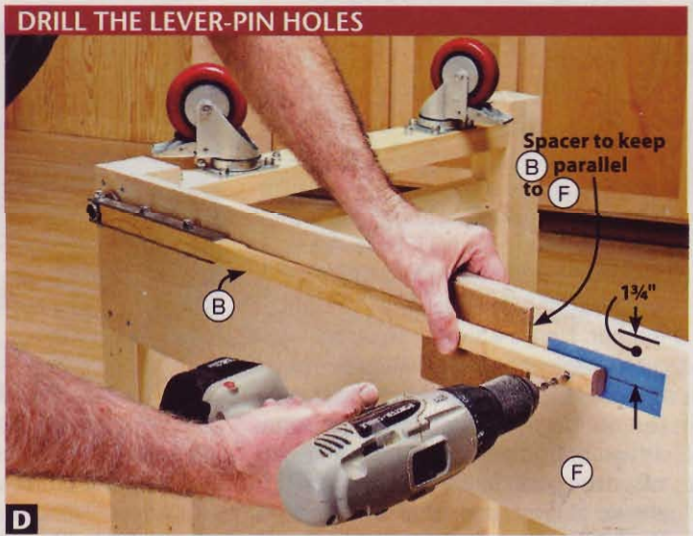
3 Place the base upside down on the floor, and slide the pipes through the legs (C), washers, pivot block (A) assemblies, and lower back rail (F) [**Drawing 3**]. Align the pivot block holes with the pipe holes, and bolt the pipes in place [**Drawing 2**]. Now slip a washer and a lever (B) assembly onto each pipe, and bolt the levers in place [**Drawing 4**].

4 Adhere masking tape to the lower back rail (F) at the location of the lever (B) ends when the casters are in the down position. Draw a line on the tape 1¾" from the bottom edge of the rail. Drill holes in the rail for the eyebolt lever pins [**Drawing 4**, **Photo D**]. Apply tape to the upper back rail at the locations of the lever ends when the casters are in the up position. Mark lines on the tape 1½" from the ends of the rail. Rotate the levers so the casters are in the up position, and drill 1"-deep holes through the rail and into the legs (C).

5 Turn the base right side up. Cut the rail stiffener (G) to size, and glue and clamp it to the top edge of the lower back rail (F) [**Drawing 4**].



C Glue and clamp the back rails (F) into the end assembly leg (C) rabbets. Check for square, drill screw holes, and drive the screws.



D Using the hole in the lever (B) as a guide, align the drill bit with the marked line, and drill a lever-pin hole through the rail (F).

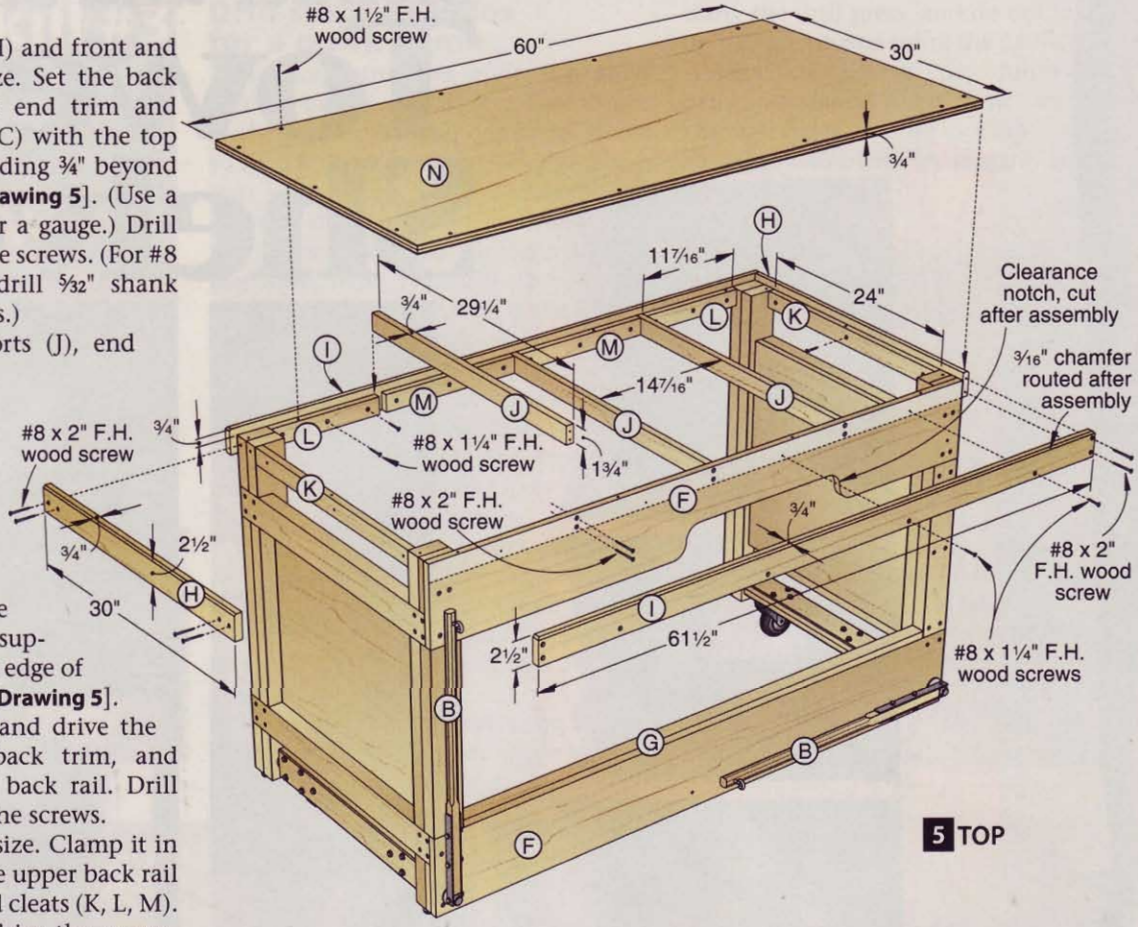
Add the top

1 Cut the end trim (H) and front and back trim (I) to size. Set the back trim aside. Clamp the end trim and front trim to the legs (C) with the top edge of the trim protruding ¾" beyond the tops of the legs [**Drawing 5**]. (Use a scrap of ¾" plywood for a gauge.) Drill screw holes and drive the screws. (For #8 screws in hardwood, drill 5/32" shank holes and 7/64" pilot holes.)

2 Cut the top supports (J), end cleats (K), outer cleats (L), and inner cleats (M) to size. Then clamp the parts in place with the top edges ¾" below the top edges of the end trim (H) and front trim (I), and with the top edges of the top supports flush with the top edge of the upper back rail (F) [**Drawing 5**]. Now drill screw holes and drive the screws. Retrieve the back trim, and clamp it to the upper back rail. Drill screw holes, and drive the screws.

3 Cut the top (N) to size. Clamp it in place, resting on the upper back rail (F), top supports (J), and cleats (K, L, M). Drill screw holes, and drive the screws. Rout a 3/16" chamfer along the outer edges of the trim (H, I).

4 Position the workbench over your tablesaw, and on the inside face of the upper back rail (F), mark the location of any part of the tablesaw that protrudes beyond the back fence rail and interferes with the upper back rail. Then transfer the marks to the outside face of the upper back rail. Now lay out a notch, adding 1" of clearance all around the obstruction. Jigsaw and sand the notch.



5 TOP

Apply finish and hardware

1 Inspect the bench, and finish-sand, where needed. Ease any sharp edges with a sanding block. Apply the finish.

2 Tap the T-nuts into the holes in the bottoms of the legs (C), and screw in the levelers. Insert eyebolts into the lever (B) end holes, and secure them with washers and lock nuts [**Drawing 4**].

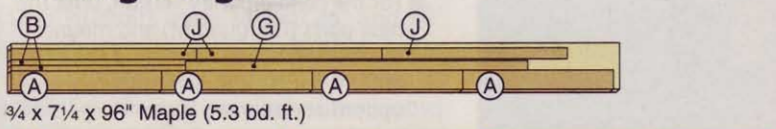
Using the workbench

1 To use the bench as a tablesaw outfeed support, rotate the levers (B) to the vertical position (casters up), and insert the protruding ends of the eyebolts into the holes in the upper back rail (F). Adjust the levelers so the bench height matches your tablesaw height.

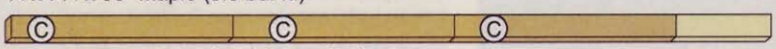
2 To position the bench over your tablesaw, first remove the blade guard, miter gauge, and rip fence from the tablesaw. Then withdraw the eyebolts from the holes in the upper back rail (F). Rotate the levers (B) to the horizontal position (casters down), and insert the eyebolts into the holes in the lower back rail (F). Now roll the bench into place, and depress the caster locks with your foot.

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Jeff Norris**, Delta, B.C.
Illustrations: **Roxanne LeMoine; Lorna Johnson**

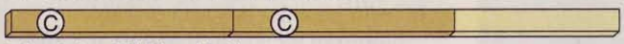
Cutting Diagram



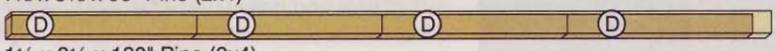
¾ x 7¼ x 96" Maple (5.3 bd. ft.)



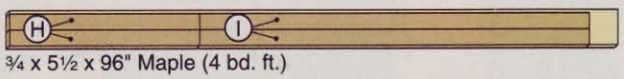
1½ x 3½ x 120" Pine (2x4) (2 needed)



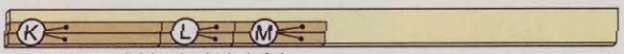
1½ x 3½ x 96" Pine (2x4)



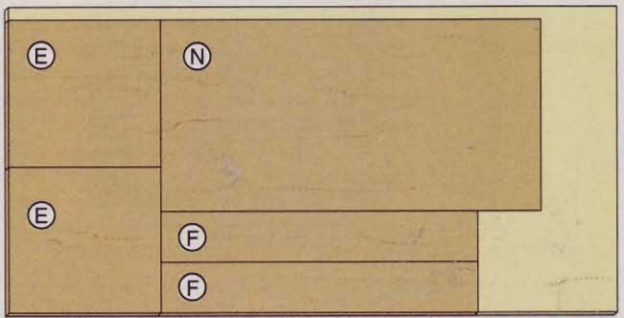
1½ x 3½ x 120" Pine (2x4)



¾ x 5½ x 96" Maple (4 bd. ft.)



¾ x 5½ x 96" Maple (4 bd. ft.)



¾ x 48 x 96" Birch plywood

Slender-and-Simple Tower Shelves

Keep favorite display pieces, CDs, and other items in this easy-to-build, narrow-case project. Make it from red oak and red oak plywood for a traditional look, *left*, or go contemporary by combining clear-finished maple with metal legs, *above*.

PROJECT HIGHLIGHTS

- Overall dimensions are 19" wide × 13½" deep × 73¾" high (traditional).
- For the contemporary version, omit the base parts (I through M) and mount the metal feet (see **Source**) to the bottom panel (B/E). For other foot options and sources, go to woodmagazine.com/footopt.

Skill Builder

- Learn how to easily and precisely flush-trim edging to the faces and ends of plywood panels.

Start with the case

1 Cut the plywood sides (A), panels (B), and shelves (C) to the sizes listed [**Materials List**, *page 56*]. Then, from ¾" stock, rip 13⁄16"-wide pieces for the side edging (D), panel edging (E), and shelf edging (F) to the lengths listed plus 1" to allow for flush-trimming with the plywood faces and ends.

2 Glue the side edging (D) to the sides (A), panel edging (E) to the panels (B), and shelf edging (F) to the shelves (C) [**Drawing 1**], centering the edging side-to-side and end to end. Next, using a flush-trim bit in your handheld router and the easy-to-make jig shown on *page 22*, rout all of the edging flush with the faces of the plywood. Then, crosscut the edging flush with the ends, as explained in the **Shop Tip**, *below*. Sand the edged parts smooth to 220 grit.

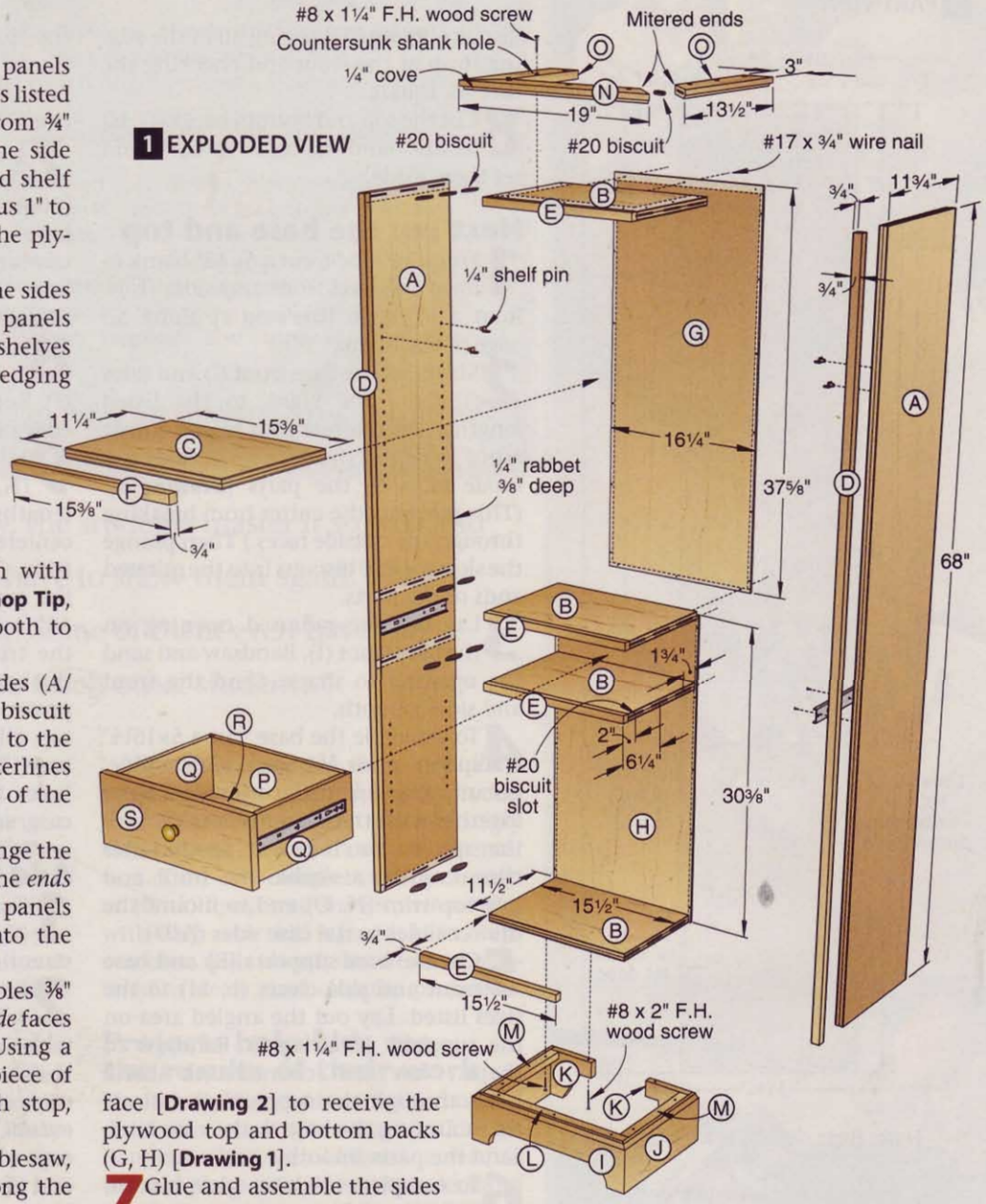
3 On the *inside* faces of the sides (A/D), draw centerlines for #20 biscuit slots for joining the panels (B/E) to the sides [**Drawing 2**]. Then draw centerlines for the mating slots in the ends of the panels [**Drawing 1**].

4 Using your biscuit joiner, plunge the slots into the sides (A/D) at the *ends* and centered into the ends of the panels (B/E). Then plunge the slots into the *center* of the sides [**Photo A**].

5 Mark centerpoints for ¼" holes ⅜" deep for shelf pins on the *inside* faces of the sides (A/D) [**Drawing 2**]. Using a brad-point bit wrapped with a piece of masking tape for a visual depth stop, drill the holes.

6 Using a dado blade in your tablesaw, cut a ¼" rabbet ⅜" deep along the back edge of each side (A/D) on the *inside* face [**Drawing 2**] to receive the plywood top and bottom backs (G, H) [**Drawing 1**].

7 Glue and assemble the sides (A/D) and panels (B/E) with #20



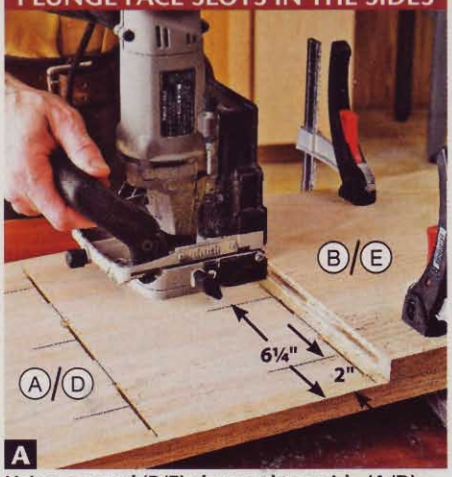
SHOP TIP

An easy way to flush-trim edging ends

Ever wonder how to trim the ends of edging flush with plywood panels without nicking them? A super-simple guide lets you do it precisely and quickly. Here's how.

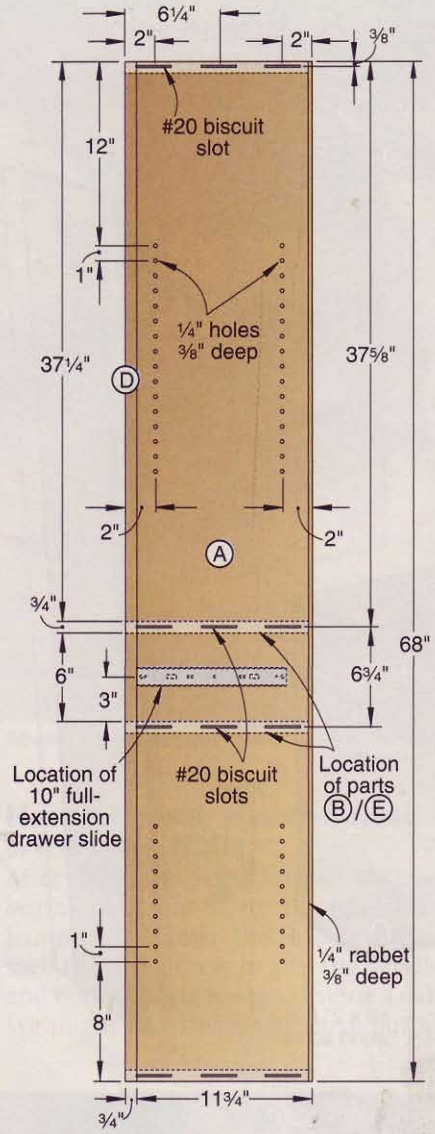
Place the long edge of a 6×12" piece of ¾" scrap (we used medium-density fiberboard) against your tablesaw rip fence, and position the fence so that the opposite edge of this guide is flush with the outside of the blade teeth. Then position and hold a panel tightly against the guide with the edging end overhanging the front. For safety, use a stand to support long panels. Start the saw, and advance the guide and panel to flush-cut the edging, as shown.

PLUNGE FACE SLOTS IN THE SIDES



Using a panel (B/E) clamped to a side (A/D) for a guide, plunge the slots for #20 biscuits in the center of the sides at the marked lines.

2 PART VIEW



Note: Right side (A) is a mirror image.

SIDE
(Inside face of left side shown)

biscuits [**Photo B**], keeping all of the edging flush at the front and checking the case for square.

8 Cut the top and bottom backs (G, H) to size. Sand the backs smooth, and set them aside.

Next up: the base and top

1 From ¾" stock, cut a 5×48" blank to form the base front and sides (I, J). Rout a ¼" cove [**Drawing 3**] along an edge of the blank.

2 Miter-cut the base front (I) and sides (J) from the blank to the listed lengths. Next, adjust your biscuit-joiner fence to center the cutter 5/16" from the *inside* faces of the parts [**Drawing 3**]. (This prevents the cutter from breaking through the outside faces.) Then plunge the slots for #20 biscuits into the mitered ends of the parts.

3 Lay out the radiused opening on the base front (I). Bandsaw and sand the opening to shape. Sand the front and sides smooth.

4 To assemble the base, cut a 5×16½" spacer from ¾" scrap. Then glue, biscuit, and clamp the front and sides together with the spacer [**Photo C**]. Save the spacer. You'll use it again (after trimming) to assemble the front and side top trim (N, O) and to mount the drawer slides to the case sides (A/D).

5 Cut the base supports (K) and base front and side cleats (L, M) to the sizes listed. Lay out the angled area on the supports [**Drawing 3**]. Bandsaw to shape. Now drill countersunk shank holes through the supports and cleats for mounting the base to the case later. Sand the parts smooth.

6 To complete the base, glue, biscuit, and clamp the base supports (K) to the sides (J) [**Photo D**]. Then glue and clamp the front and side cleats (L, M) in position, flush with the top edges of the front (I) and sides.

7 To mount the base, position and clamp it to the bottom of the case [**Photo E**]. Using the shank holes in the base supports (K) and front and side cleats (L, M) as guides, drill pilot holes into the case, and drive the screws [**Drawing 1**].

8 From ¾" stock, cut a 3×48" blank to form the front and side top trim (N, O). Rout a ¼" cove [**Drawing 1**] along an edge of the blank.

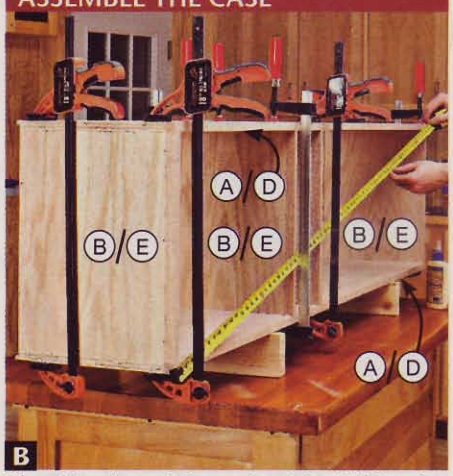
9 Miter-cut the front and side trim (N, O) from the blank to the listed lengths. Plunge slots for #20 biscuits centered into the mitered ends of the trim. To assemble the trim, crosscut the spacer that you set aside earlier to 13" long. Then glue, biscuit, and clamp the trim together, using the spacer at the back to keep the parts square. Now position and clamp the trim to the case top, aligning the trim as you did for the base. Drill the countersunk mounting holes through the trim and into the case, and drive the screws.

Add the drawer

1 Cut the drawer front/back (P), sides (Q), bottom (R), and face (S) to the sizes listed. Sand smooth.

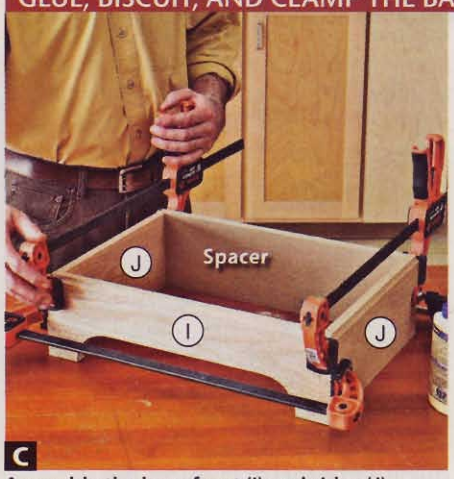
2 To form the drawer joint [**Drawing 4a**], use a dado blade in your tablesaw or a straight bit in your router to cut or rout a ¼" rabbet ¼" deep along each end of the front/back (P) on the *outside* faces [**Drawing 4**]. Then cut or rout a ¼" dado ¼" deep ¼" from each end of the sides (Q) on the *inside* faces. Now cut a ¼" groove ¼" deep ¼" from

ASSEMBLE THE CASE

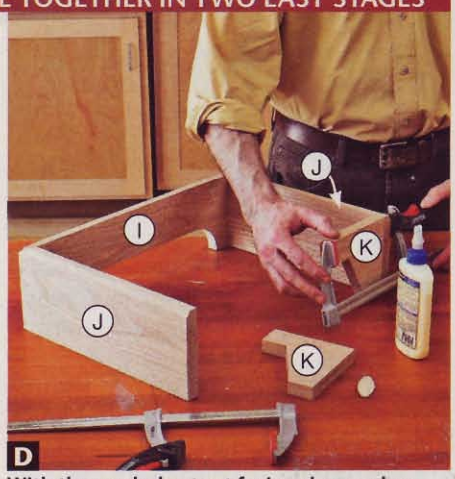


Glue, biscuit, and clamp the sides (A/D) and panels (B/E) together. Measure for equal diagonals to verify square.

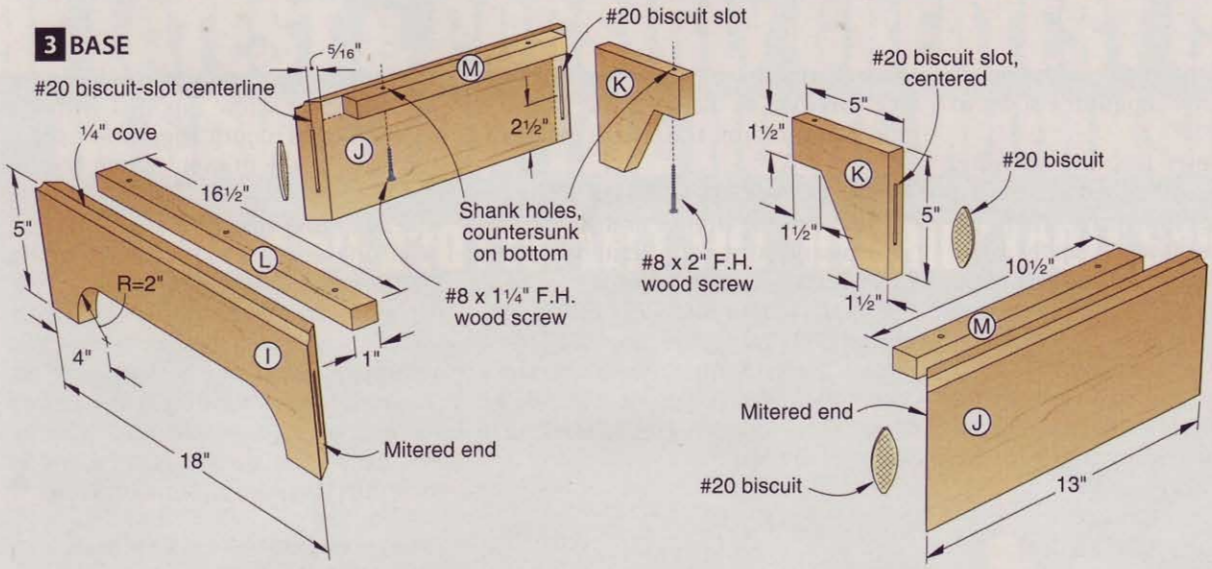
GLUE, BISCUIT, AND CLAMP THE BASE TOGETHER IN TWO EASY STAGES

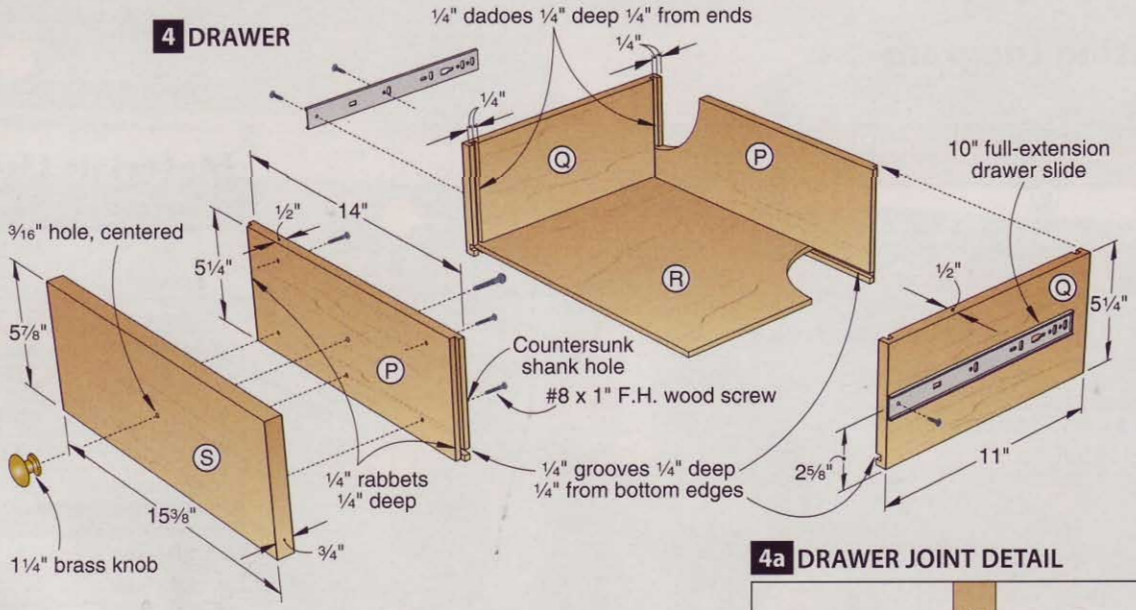


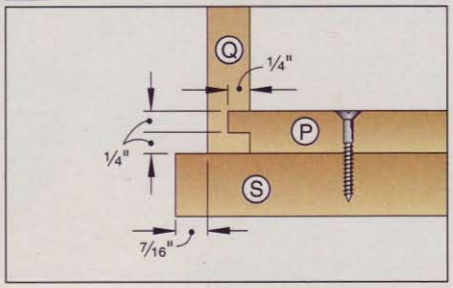
Assemble the base front (I) and sides (J) together with glue, biscuits, and a ¾×5×16½" spacer to keep the assembly square.



With the angled cutout facing down, glue, biscuit, and clamp each base support (K) to a side (J).





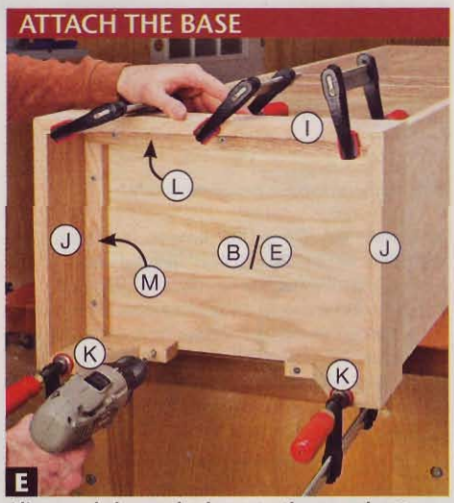


the bottom edges of the front, back, and sides to fit the plywood bottom (R).

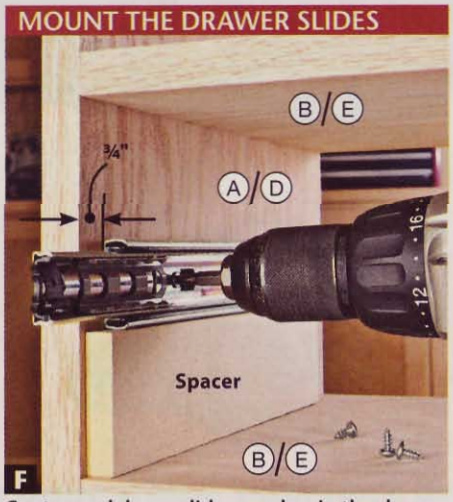
3 Glue and clamp the front/back (P) and sides (Q) together with the bottom (R) captured in the grooves. Check for square.

4 Separate the members of the 10" full-extension drawer slides. Using the screws supplied with the slides, mount a small slide member to each *drawer side (Q), centered top to bottom* and flush at the front [**Drawing 4**].

5 To mount the large slide members to the case sides (A/D) [**Drawing 2**], position the case on a side. Using a square, draw a line across the width of a side, centered in the drawer opening between the panels (B/E). Center the mounting holes in a slide on the line. Measure from the top of the lower center panel to the bottom of the slide. Next, rip the ¾" spacer to your measurement and crosscut the piece to 11" long. Now, using the



Align and clamp the base to the case bottom, flush at the back and centered side-to-side. Drill the pilot holes, and drive the screws.



Center each large slide member in the drawer opening with a spacer. Align the large slide end ¾" from the front edge of the side (A/D).

spacer to center the slides in the opening, align and screw-mount the slides to the sides [**Photo F**].

6 Slide the drawer into the opening, engaging the slides, and verify that the slides move smoothly. Then, to mount the drawer face (S), apply a few pieces of double-faced tape to the back. Center the face in the opening, and press the face firmly to the drawer front (P). Next, drill a centered 3/16" hole through the face and drawer front for mounting a 1¼" brass knob. Now, extend the drawer. Drill the mounting holes through the drawer front and into the face [**Drawing 4**]. Remove the face and tape. Screw-mount the face to the front.

Time to wrap things up

1 Remove the drawer and slides. Finish-sand any parts that need it to 220 grit, and remove the dust.

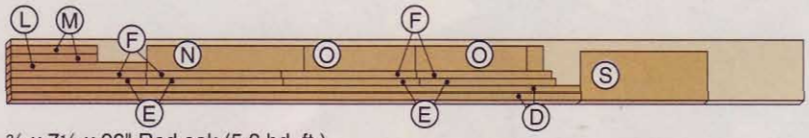
2 Apply a stain and clear finish. (We applied Varathane no. 245 Traditional Cherry Stain followed by three coats of Minwax Polycrylic Water-Based Clear Satin Protective Finish, sanding to 320 grit between coats.)

3 Fasten a 1¼" brass knob to the drawer using the screw supplied with the knob. Then remount the drawer slides, and slide in the drawer. Attach the top and bottom backs (G, H) with #17×¾" wire nails [**Drawing 1**].

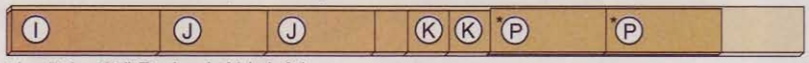
4 Using a helper, move the unit to the desired location. ***Caution:*** *To prevent tipping, secure the unit to the wall, driving suitable fasteners into a stud. Or install an anti-tip kit, containing a short cable and brackets for screw-mounting to the case back and wall (available at your local home center).* Install the shelves (C/F) using ¼" shelf pins [**Drawing 1**]. Now fill 'er up.

Written by **Owen Duvall** with **Kevin Boyle**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

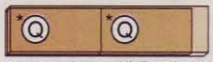
Cutting Diagram



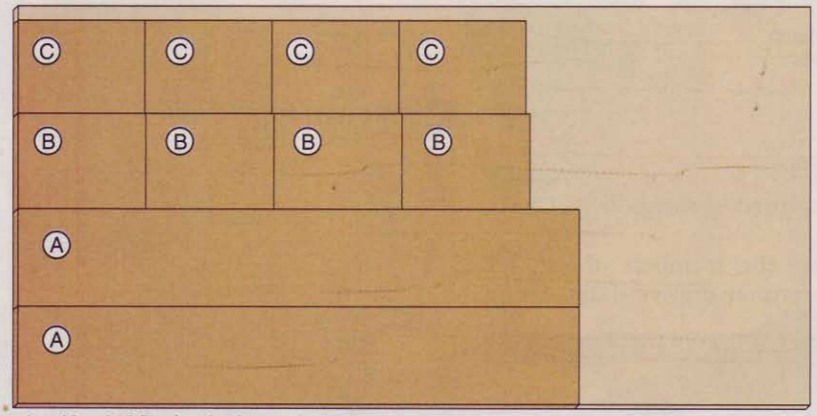
¾ x 7¼ x 96" Red oak (5.3 bd. ft.)



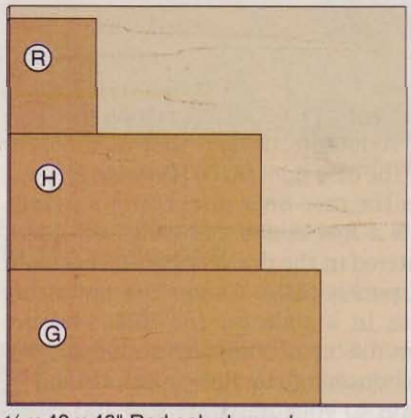
¾ x 5½ x 96" Red oak (4 bd. ft.)
*Plane or resaw to the thickness listed in the Materials List.



¾ x 5½ x 24" Red oak (1 bd. ft.)



¾ x 48 x 96" Red oak plywood



¼ x 48 x 48" Red oak plywood

Materials List

Case		FINISHED SIZE T	W	L	Matl.	Qty.
A	sides	¾"	11¾"	68"	OP	2
B	panels	¾"	11½"	15½"	OP	4
C	shelves	¾"	11¼"	15⅜"	OP	4
D*	side edging	¾"	¾"	68"	O	2
E*	panel edging	¾"	¾"	15½"	O	4
F*	shelf edging	¾"	¾"	15⅜"	O	4
G	top back	¼"	16¼"	37⅝"	OP	1
H	bottom back	¼"	16¼"	30⅜"	OP	1
Base and top trim						
I*	base front	¾"	5"	18"	O	1
J*	base sides	¾"	5"	13"	O	2
K	base supports	¾"	5"	5"	O	2
L	base front cleat	¾"	1"	16½"	O	1
M	base side cleats	¾"	1"	10½"	O	2
N*	front top trim	¾"	3"	19"	O	1
O*	side top trim	¾"	3"	13½"	O	2
Drawer						
P	front/back	½"	5¼"	14"	O	2
Q	sides	½"	5¼"	11"	O	2
R	bottom	¼"	14"	10½"	OP	1
S	face	¾"	5⅞"	15⅜"	O	1

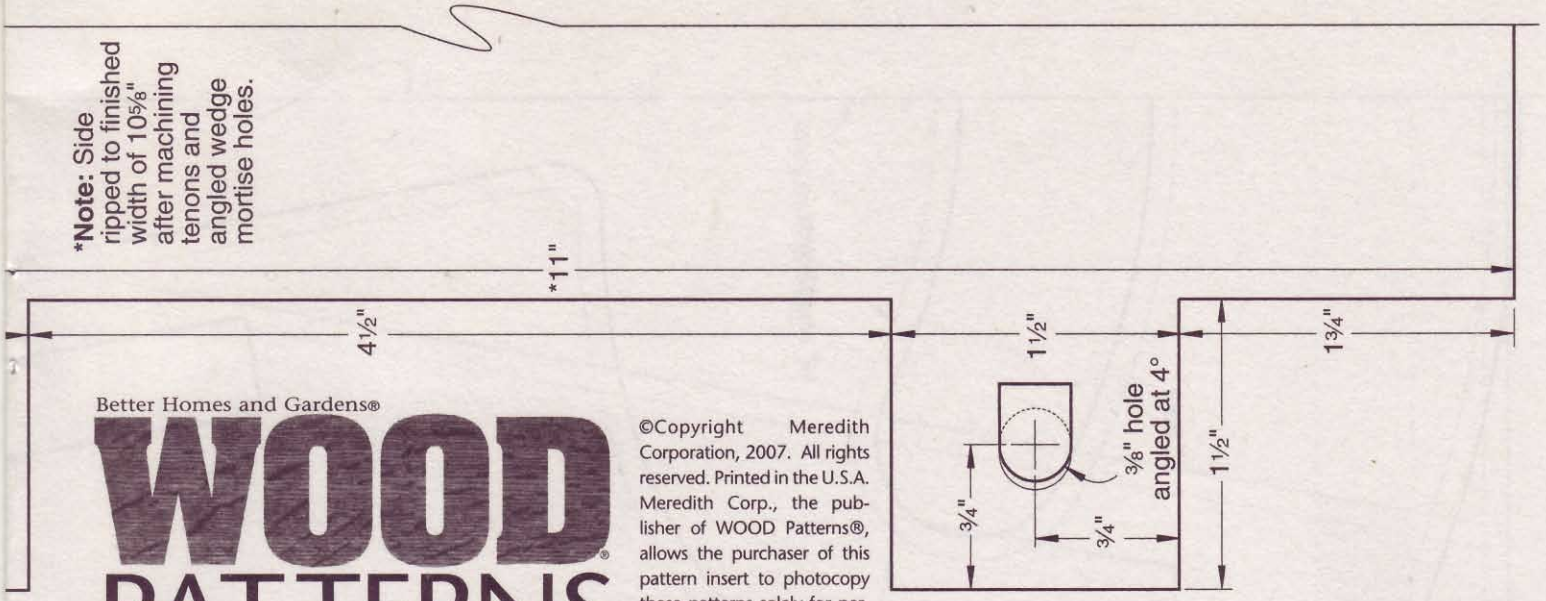
*Parts initially cut oversize. See the instructions.

Materials key: OP–red oak plywood, O–red oak.
Supplies: #20 biscuits (30), #8x1" flathead wood screws (5), #8x1¼" flathead wood screws (16), #8x2" flathead wood screws (2), 10" full-extension drawer slides (1 pr.), double-faced tape, 1¼" brass knob, #17x¾" wire nails, anti-tip kit, ¼" shelf pins (16).
Blade and bits: Dado-blade set (or ¼" straight router bit); flush-trim and ¼" cove router bits; ¼" brad-point bit.

Source

Metal legs (for contemporary version): 4½"-high satin-nickel legs with self-leveling glides no. 35937, $12.79 ea. (4) plus shipping and handling. Call or click Rockler; 800-279-4441, rockler.com.

*Note: Side ripped to finished width of 10⅝" after machining tenons and angled wedge mortise holes.



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September 2007 Issue 178

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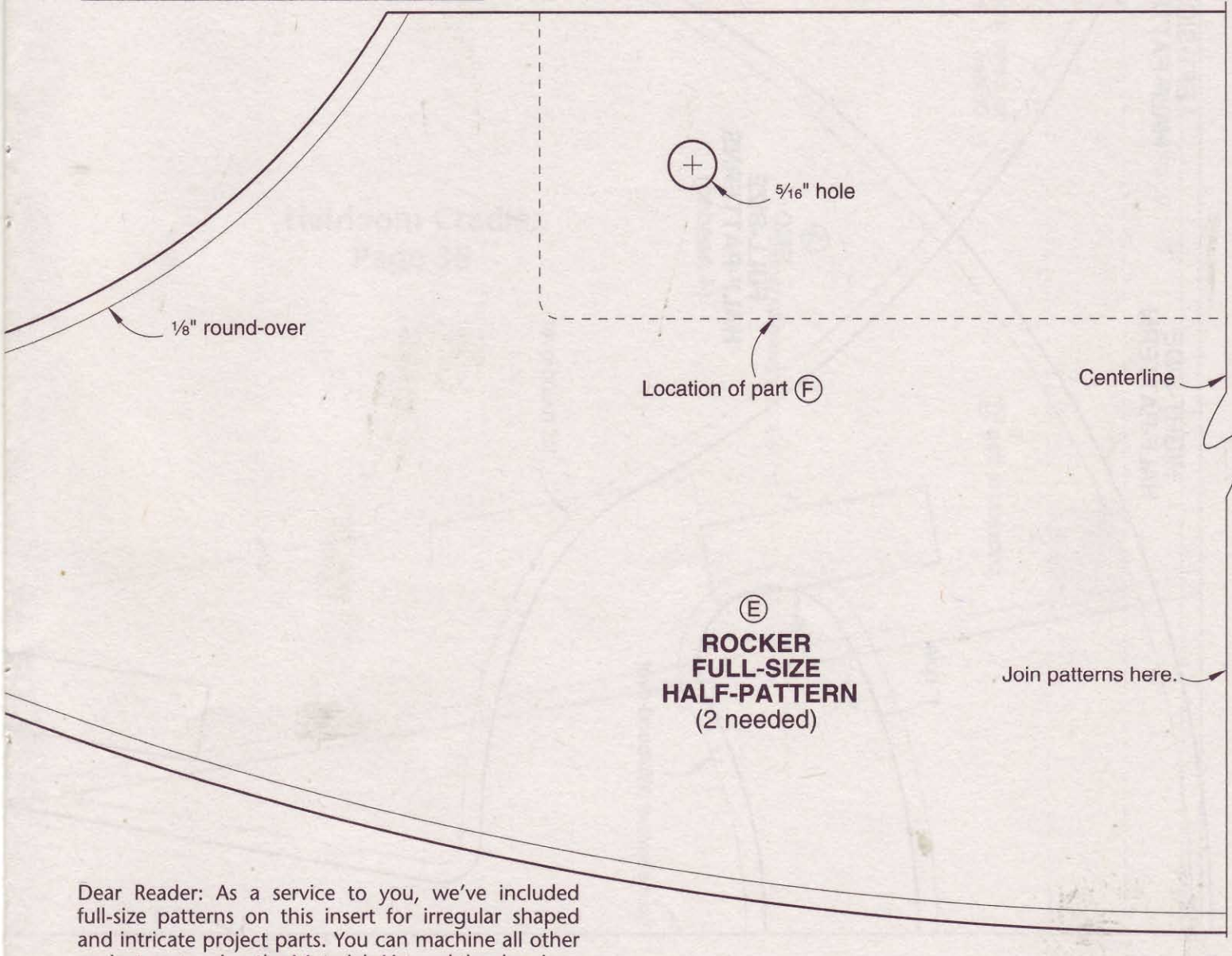
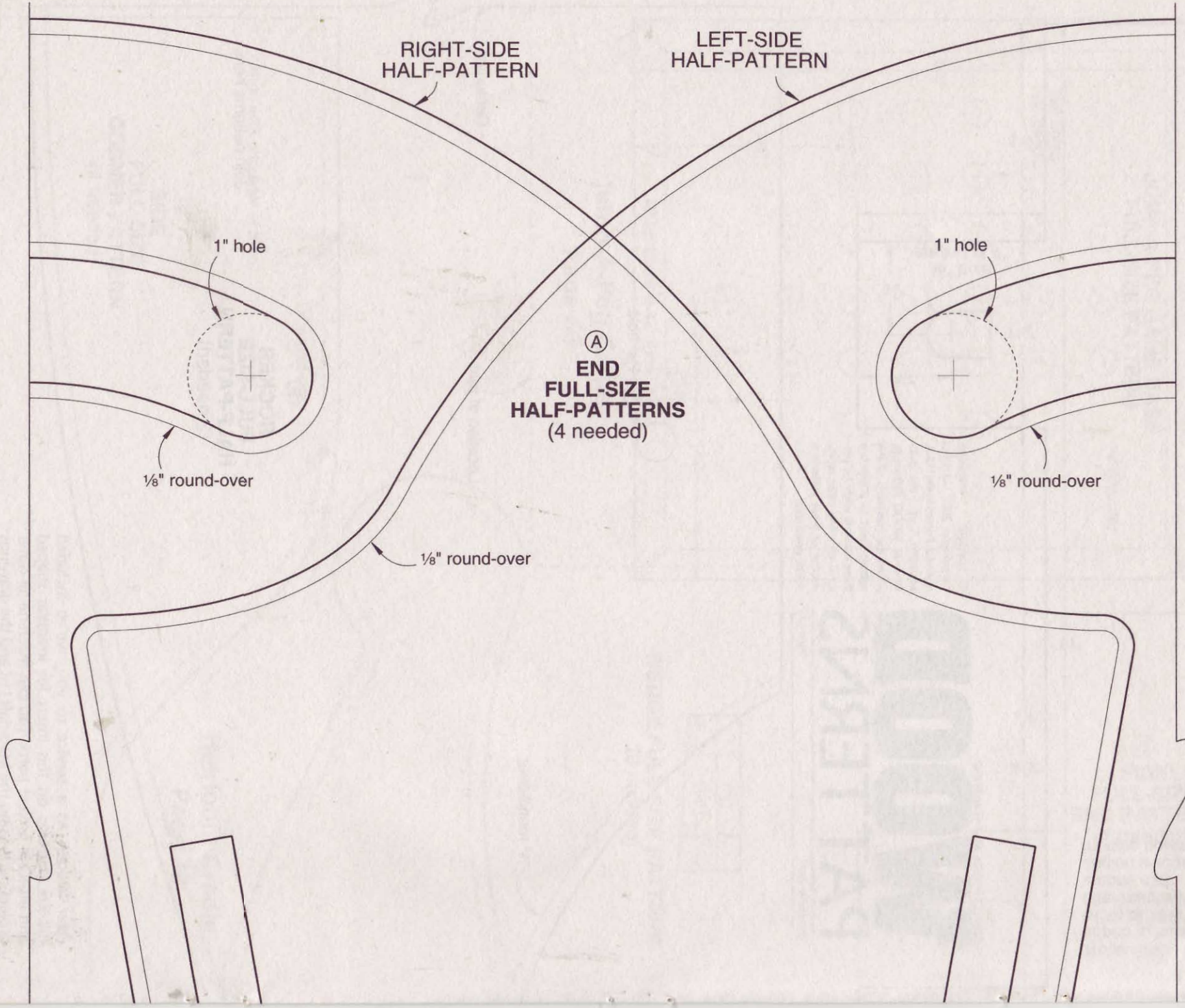
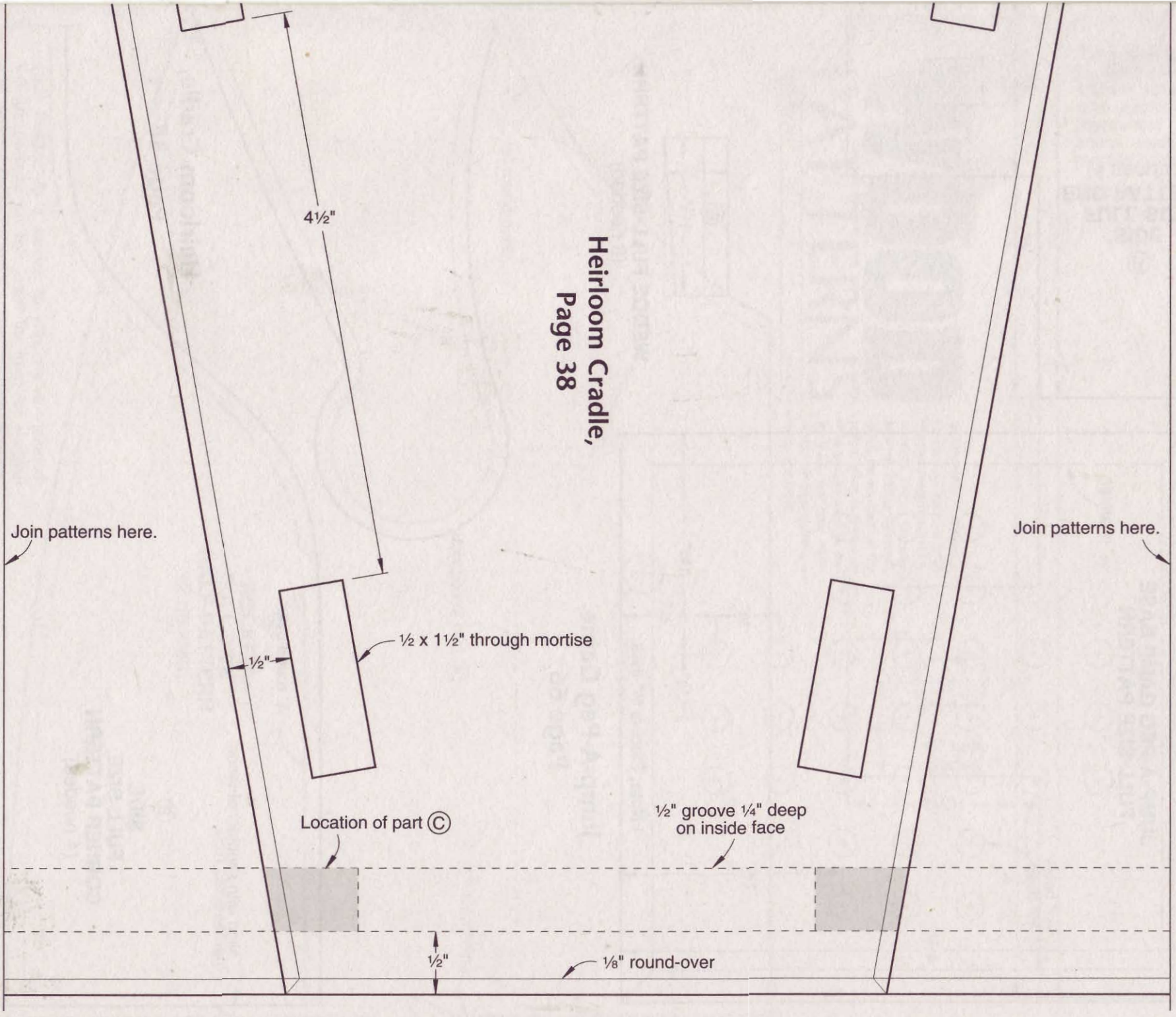
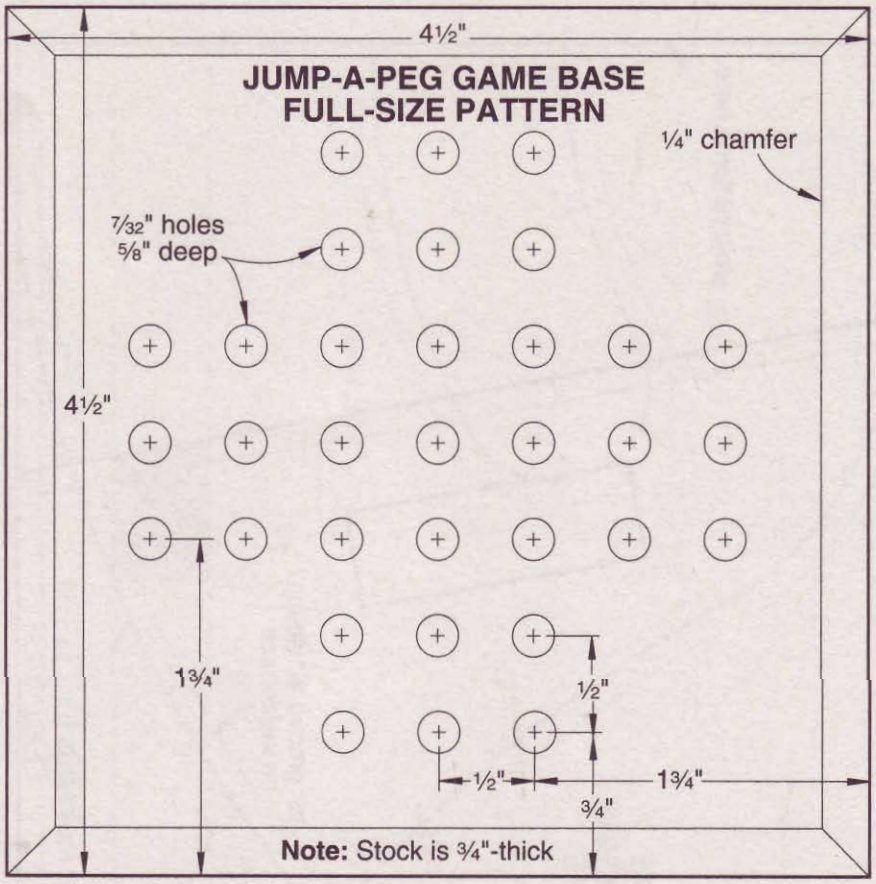


(E)
ROCKER
FULL-SIZE
HALF-PATTERN
(2 needed)

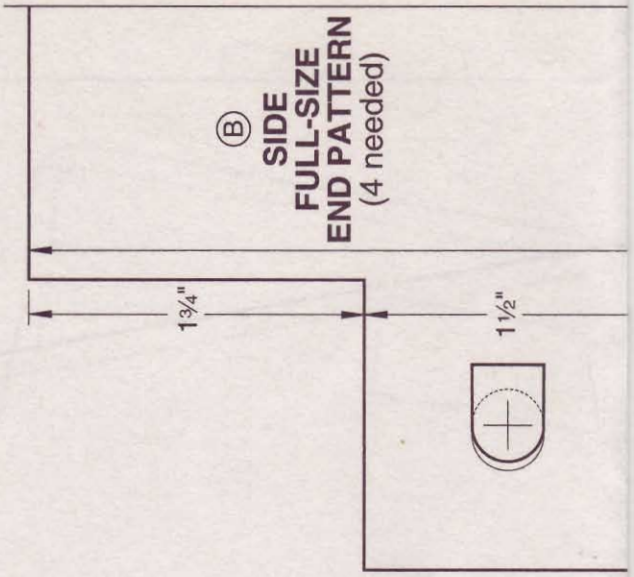
Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

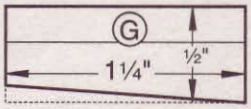

RIGHT-SIDE
HALF-PATTERN
LEFT-SIDE
HALF-PATTERN
1" hole
1" hole
Ⓐ
END
FULL-SIZE
HALF-PATTERNS
(4 needed)
⅛" round-over
⅛" round-over
⅛" round-over


Heirloom Cradle,
Page 38
4½"
Join patterns here.
Join patterns here.
½ x 1½" through mortise
½"
Location of part Ⓒ
½" groove ¼" deep
on inside face
½"
⅛" round-over

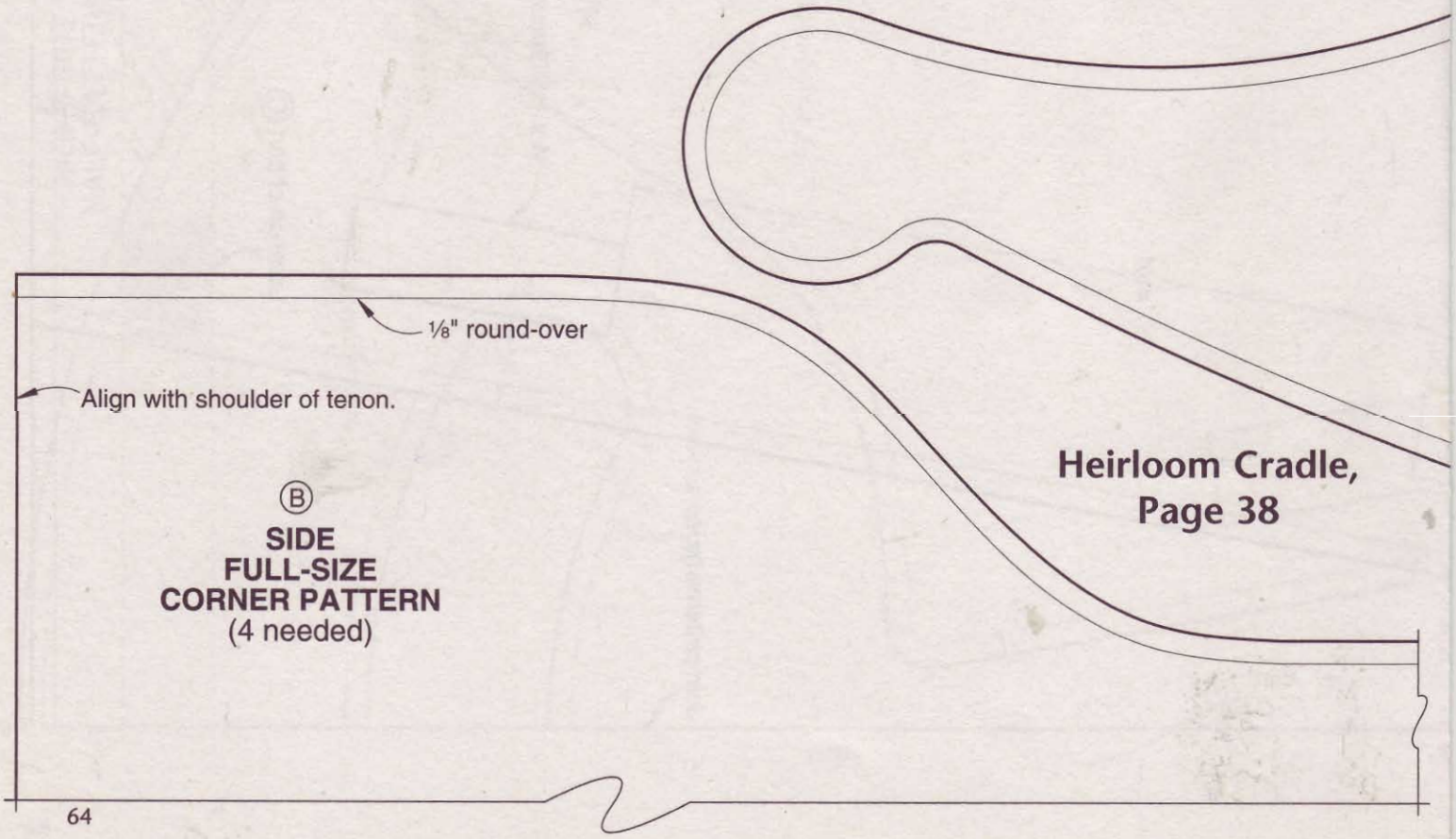


Jump-A-Peg Game,
Page 66





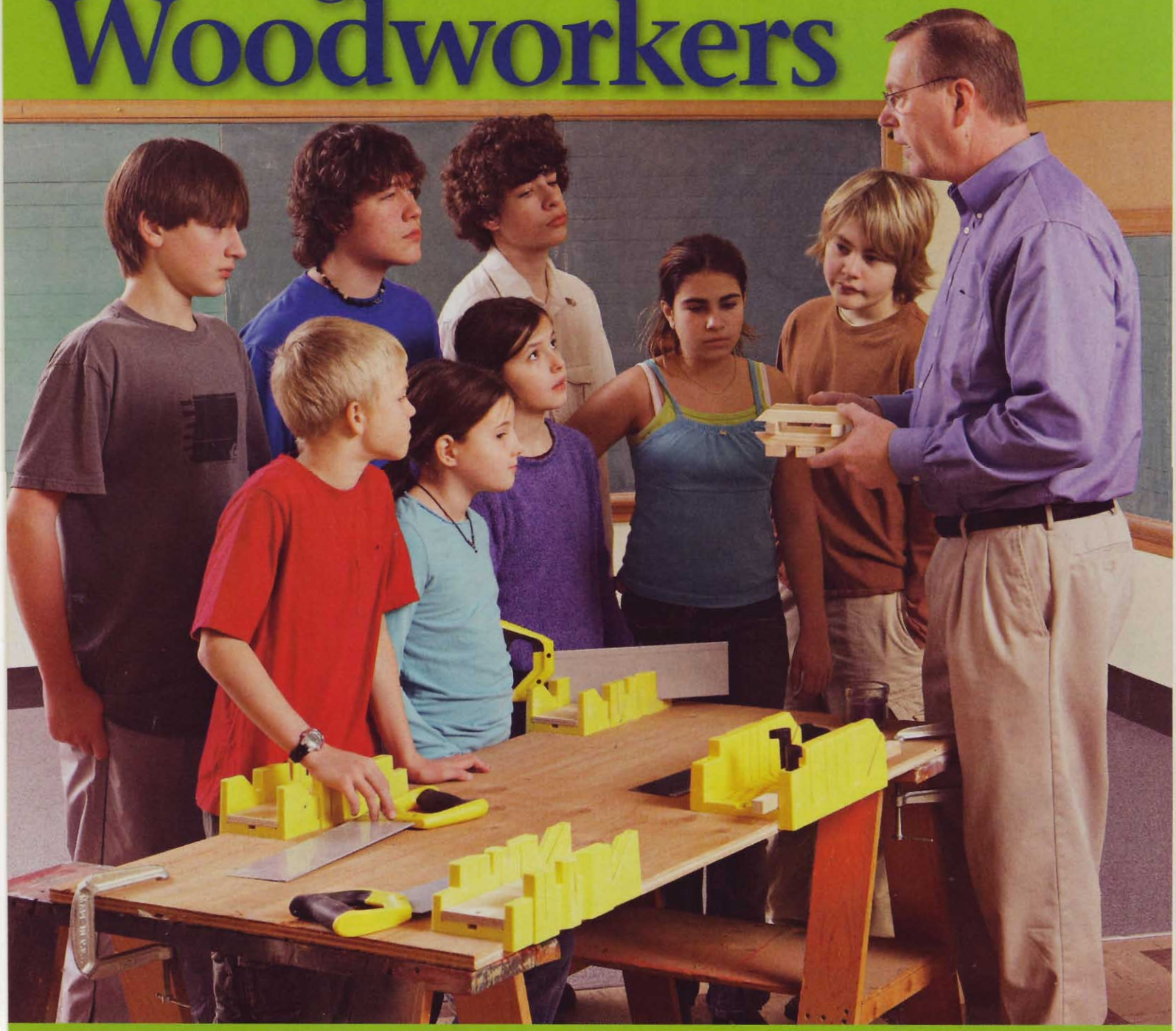
WEDGE FULL-SIZE PATTERN
(8 needed)



Heirloom Cradle,
Page 38

Ⓑ
SIDE
FULL-SIZE
CORNER PATTERN
(4 needed)

Growing Tomorrow's Woodworkers



Entrepreneur Paul Meisel has developed a simple, proven system to turn kids on to woodworking

Example isn't another way to teach, it is the only way to teach.

—Albert Einstein

Blame it on budget cuts or demand for more college-prep classes, but academia has gradually pushed vocational skills, such as woodworking, closer to extinction in public schools across America. So if schools will no longer teach woodworking, woodworkers need to step up to ensure that the next generation will experience the joys of our craft.

One man has already begun. Paul Meisel, a former junior-high-school industrial arts teacher who's now a woodworking supplier, has created a program—drawing from a method called Study Technology—that anyone can implement to teach youngsters about woodworking. We joined Paul at Flagship Academy in Minneapolis, where he volunteer-teaches students age 9 to 14.

It's up to you to stress safety

Before teaching children how to work with wood, check with your insurance company about coverage and liability. Then, follow these guidelines:

- ✔ Prepare your shop by clearing the benchtops, work areas, floor, and walkways of anything that could be a hazard.
- ✔ Wear safety glasses when using any tools, even hand tools. Wear hearing protection when using power tools.
- ✔ Because youngsters likely have never used tools before, it's imperative to show them the correct methods and techniques. Don't take for granted that they know how to use even the simplest tools.
- ✔ Do not allow running, horseplay, teasing, or throwing anything.
- ✔ Have them dress appropriately, especially when using power tools: Roll up long sleeves past the elbows; don't wear coats or gloves while working; tie all shoestrings tightly; remove all necklaces, bracelets, and rings; secure long hair so it's tied up or back.
- ✔ Do not hold screws or nails in your mouth.
- ✔ Have them come to you immediately if they get sawdust in an eye or a splinter in a finger.

"By teaching it this way, the students master it so well and so quickly, you don't have to show them again. They literally thrive on it. Some of them even have the confidence to teach other students."

Teaching fundamentals: Master, then move on

Whether you learned woodworking in school, from your father or grandfather, from magazines, books, or videos, or if your skills simply grew from tackling home-repair projects, at some point you had to learn the basic skills from someone. Paul's program enables you to be that someone in a child's life.

"For many of the kids who took a woodshop class in school, that was their first and sometimes only exposure to working with tools and wood," says Paul. "Some of them will never pick up a tool again, but most of them will use what they learned in that class over and over again at different points in their lives. So missing that exposure as a child can have long-term effects."

The key to Paul's program lies in using the three components of Study Technology. First, apply a gradient approach: Break down each skill to a basic level, and get the child to master it through repetition before advancing to the next skill. "By teaching it this way, the students master it so well and so quickly, you don't have to show them again," Paul explains. "They literally thrive on it. Some of them even have the confidence to teach other students."

"This is the first time I've actually gotten to use tools," says 13-year-old Kore Hanson. "It's a lot of fun. I never get to do stuff like this. I like to make things and take them home to my mom."

With the second phase, students touch, create, and experience what they're learning rather than rely solely on textbook theories and documentation. They also complete a project, such as the lollipop tree shown at *top right*, with each new skill learned. Later steps combine skills already learned and mastered to create more complex projects.

Projects help kids see the results of their work

The third phase deals with the "misunderstood word phenomenon." This happens when a child hears or reads a word or phrase and does not understand it, yet continues on despite being confused. "It's like when you get to the end of a page and ask yourself, 'What did I just read?' " Paul explains. "You can always trace your point of confusion back to a word you didn't understand."

To avoid this, Paul explains every detail in terms the youngsters can understand, and encourages them to ask questions when something eludes them. Don't assume kids know basic woodworking terms.

Paul hopes to see this program picked up and taught to Scout troops, 4-H clubs, summer camps, after-school programs, schools, or even grandchildren or neighborhood kids. "Repetition and mastery of skills are the critical elements," he insists, "and you certainly don't need to be a licensed teacher to be able to teach this program."

TOP: Stef Brunner, 10, puts the last treat in place on her lollipop tree. Students use sawing, sanding, and drilling skills on this project.
MIDDLE: Kids enjoy playing the jump-a-peg games they make. The pegs are stained ¼" dowels inserted into stopped holes.
BOTTOM: Paul Meisel, right, shows Kore Hanson, 13, how to properly grip a claw hammer.

Fun Projects to Master Four Basic Skills

Above, Kore maps out his name on a plaque by driving in ⅝" wire nails.

Hammer out a nameplate with wire nails

After learning safety rules, students begin using an 8- to 13-ounce claw hammer. Kids learn the parts of a hammer, the correct way to grip the handle, and how to swing it when driving a nail. We might take this for granted, but it's not easy to do for kids who have never used a hammer.

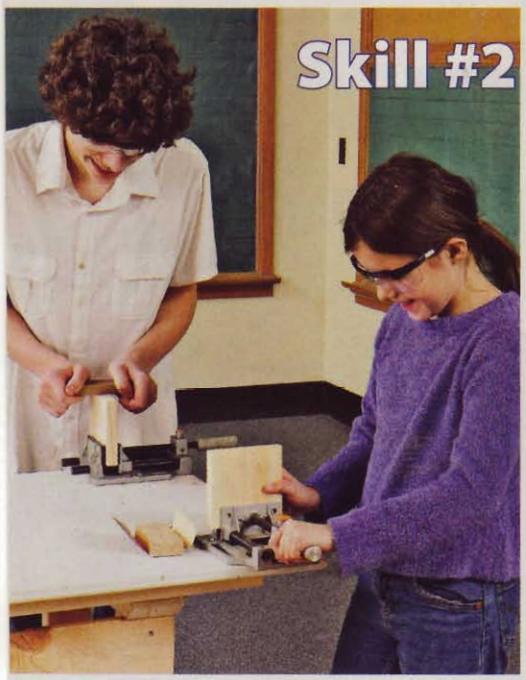
They practice driving ⅝" 18-gauge wire nails and 1¼" 17-gauge wire brads into pine. When they've gained confidence, they move on to the project: a nameplate. After tracing their names with carbon paper onto a ¾×4" pine blank (precut by the instructor to a length suitable for each child's name), the students drive ⅝" wire nails into the letters, as shown at *left*.

"There's inevitably a lot of elephant tracks on their boards, and a few sore fingertips when they're done," Paul laughs. "But in the course of making their name plates I see great progress."

"I like nailing the best," says a grinning Stef Brunner. "It was fun, because I never did it before."

Students master this skill when they can:

- ✔ Explain why the face of the hammer is slightly rounded (to set a nail flush with the board face without creating a big dent)
- ✔ Show the correct way to grip a hammer
- ✔ Describe the difference between wire brads and wire nails (Wire brads have smaller, dimpled heads to accept a nail set, while wire nails have larger, flat heads.)
- ✔ Join two boards at 90° with 1¼" wire brads
- ✔ Drive nails without bending them
- ✔ Explain what to do if a wire nail or brad bends or changes its angle while driving.



Tyler Moe, 14, sands end grain on his jump-a-peg base, while Stef Brunner repositions her workpiece in the vise.

Sand to remove marks and make wood smooth

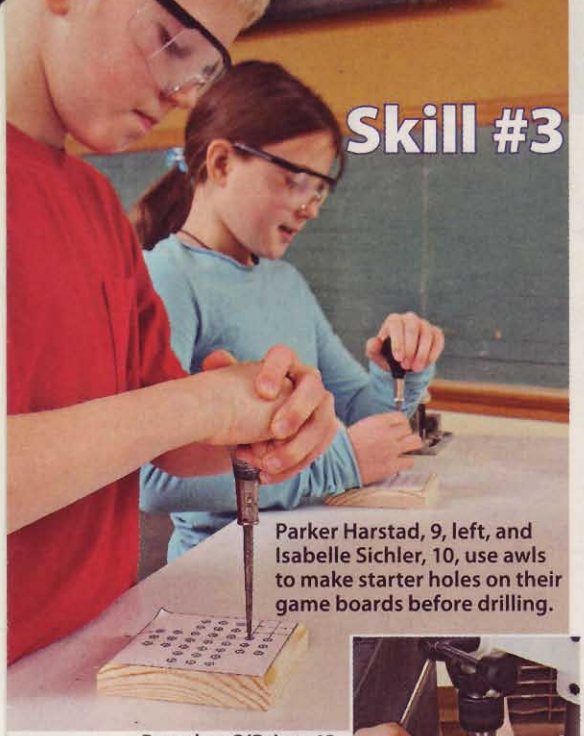
If they're going to get involved in woodworking, kids might as well learn early the necessity of sanding their work, even though it might not be a lot of fun. Paul teaches his students to wrap sandpaper around a square-edge wood block, and sand by hand. He explains the importance of beginning with coarse-grit sandpaper (60 or 80 grit) to remove machining marks, and then finish-sanding (120 to 220 grit) to eliminate scratches and smooth the wood surface.

He also demonstrates how to sand with the grain rather than across it to avoid making scratches that are more noticeable. Students then implement these new skills by sanding all surfaces on a ¾×4½×4½" pine blank for a jump-a-peg game, which carries into Skill #3.

"It should take only 15 to 20 strokes to remove saw marks," Paul explains. "Then, as you change grits, it should take fewer strokes. Many of them sand much longer than they need to."

Students master this skill when they can:

- ✔ Wrap sandpaper around a sanding block
- ✔ Sand while holding the sanding block flat on the workpiece
- ✔ Sand face grain, edge grain, and end grain
- ✔ Explain how different grades of sandpaper are used to remove saw marks and smooth the wood surface
- ✔ Explain why you wipe away sanding dust rather than blow it. (Wiping it off a board allows dust to drop, while blowing it suspends it in the air and could get it in your eyes.)



Parker Harstad, 9, left, and Isabelle Sichler, 10, use awls to make starter holes on their game boards before drilling.

Brendon O'Brien, 13, drills the 7/32" holes for the jump-a-peg gamepieces. Students drill the holes with the pattern attached.

Drill stopped holes for a quick game

This phase introduces students to their first power tool, a drill press. Paul thinks it's best to use a small benchtop model so the children don't have to stand on a step stool to reach the controls. They practice on scrapwood before drilling the 33 stopped holes for their jump-a-peg game base. To begin, they adhere the full-size pattern, found in the *WOOD Patterns®* insert on *page 57*, to the base with clear or masking tape. Next, they punch starter holes, as shown at *left*. Students then drill the holes ⅝" deep, shown *below left*, using the depth stop on the drill press. (Paul provides the precut, finished gamepieces.)

Using a drill press brings additional safety rules:

- Remove the chuck key after installing a bit and before turning on the power.
- Hold or clamp workpieces securely when drilling.
- Do not reach near a spinning bit.
- Do not talk to anyone while you are using the drill press, and do not talk to or distract anyone using the drill press.

After completing the jump-a-peg game, students learn how to drill through-holes using scrap stock. Through-holes play an integral role in the next project.

Students master this skill when they can:

- ✔ Select the correct drill bit for a desired hole
- ✔ Install and tighten a bit into the drill chuck
- ✔ Set and use a vertical depth stop on the drill press for partial-depth holes, and a horizontal stop by clamping a fence to the table
- ✔ Correctly lower and raise the quill feed handle when drilling
- ✔ Align the bit with the center hole to avoid drilling into the table
- ✔ Use a backer board to prevent tear-out when through-drilling.

FAR LEFT: Nikki Dickerson, 13, Ryan Moe, 13, and Brendon O'Brien cut "branches" for their lollipop trees.
MIDDLE: Paul explains a miter cut to Nikki and how to make one using a miterbox.
RIGHT: After squaring one end of their workpieces, the students measure and mark it for length.

Crosscut wood with a saw and miterbox

Before they have the confidence to use a power saw, students learn the basics of sawing wood by hand. For this, Paul uses a crosscut backsaw with a miterbox. After students make several 45° and 90° practice cuts in ¾×¾" pine, they begin making their next project: the lollipop tree. (See *the next page* for dimensions.) This consists of nine successively longer pieces cut from ¾×¾" stock prepared by the instructor, as well as 2"- and 4½"-square blocks for the base. (They also drill holes through each "branch" for the lollipops and the center dowel, as well as dowel holes in the base blocks.) Students learn to use a tape measure and pencil to mark each piece, as shown *above right*, then saw on the waste side of the mark.

"It's not instinctive to pick up a saw and start cutting," Paul says. "You have to teach them the right technique, how to start a cut, to take about one stroke per second."

Paul adds the skill of painting for the lollipop tree. He thins interior latex paint with equal parts water to color the wood but still allow the grain to show through. Students apply it like a dye, wiping off the excess after a minute.

Students master this skill when they can:

- ✔ Correctly hold boards in a miterbox
- ✔ Explain why they should cut on the waste side of the line
- ✔ Hold the saw parallel to the workpiece's top face while sawing
- ✔ Explain why it's best to start a cut by pulling the saw toward you
- ✔ Give four examples where miter joints would be used.

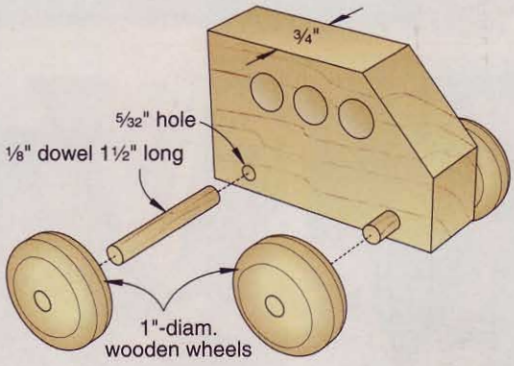
Combine the Skills in Fun-to-Make Projects

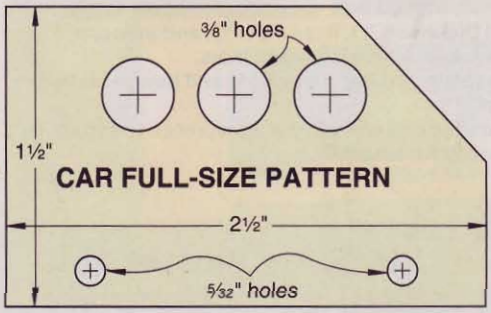
Plant holder

Candle holder

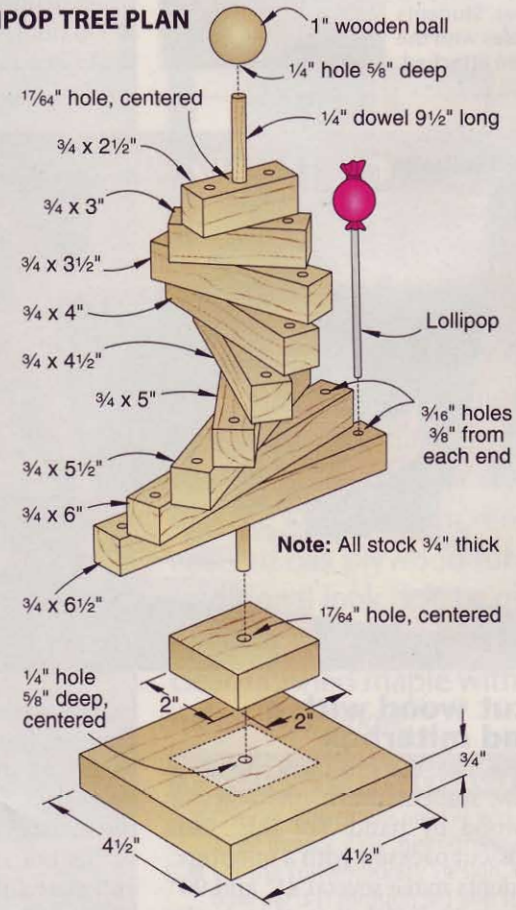
Wind spinner

TOY CAR PLAN





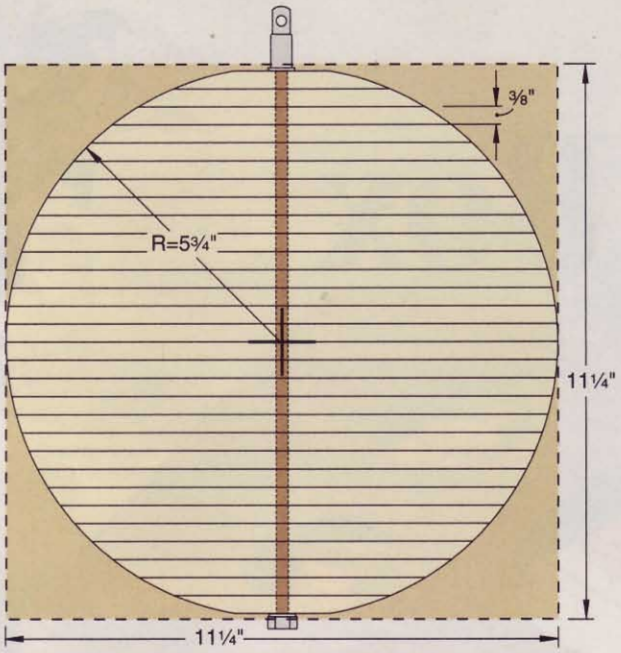
LOLLIPOP TREE PLAN



Putting it all together

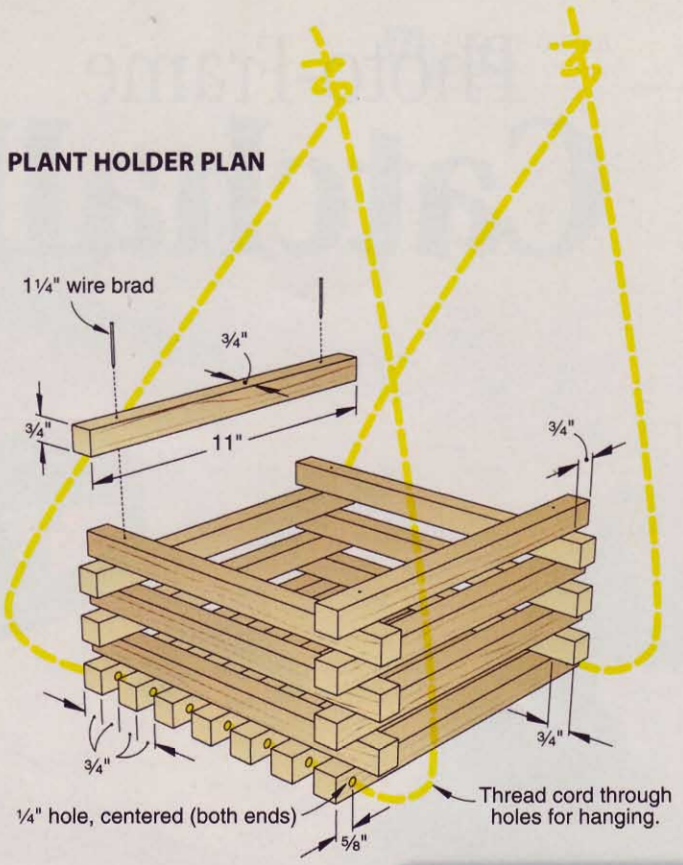
Paul has designed each project to reinforce skills and provide opportunities to practice them. For the candle holder, shown *above center*, students begin by cutting to length the three bottom pieces from ¾×1¼" stock (determined by the size of the candle). Next, they cut to length the six side pieces from ¾"-square stock with 45° beveled ends, using a stopblock to ensure they're all the same length. After sanding each part, the students assemble them with glue and 1¼" wire brads.

For another project, the kids make small cars, shown *top center*, from ¾×1½" pine. They saw the car body to length, cut the windshield angle in front, then sand all surfaces smooth. Next, they drill holes for windows (one for a delivery truck, two for a car or van, and three for a bus) and wheel axles. Finally, they install store-bought wheels onto precut axles.

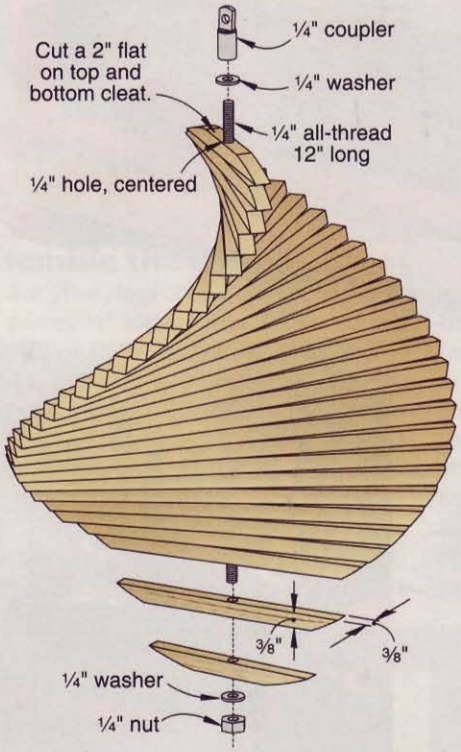


Enlarge 400% for full-size pattern

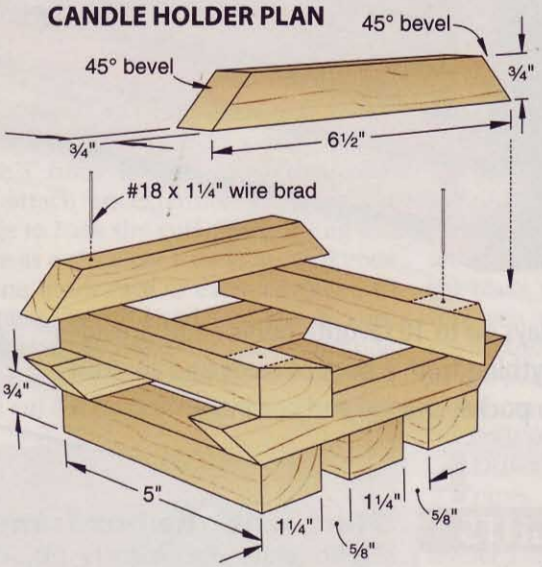
PLANT HOLDER PLAN



WIND SPINNER PLAN



CANDLE HOLDER PLAN



Students can build a hanging plant holder, shown on *previous page* and *above right*, that's similar to the candle holder. After cutting all the parts from ¾"-square pine or cedar, they drill holes through each end of the bottom pieces to receive twine for hanging. Next, they assemble it with glue and 1¼" wire brads.

A wind spinner, shown *above*, makes an entertaining outdoor project. The kids build it from cedar, which holds up well against weather, or pine if they plan to paint it. Components consist of successive lengths, shorter at the bottom and top and wider in the middle, with a hole in the center for the hanging rod.

Paul continues to develop his program, and plans to publish it someday as a book. He encourages you to set up your own skill courses as long as you keep them simple and understandable, teach them through repetition, and create a project that uses the new skills as well as those already learned. He continues to develop additional projects to accompany skill lessons. Next on his radar: gluing and clamping, using screws, power sanding, scrollsawing, bandsawing, and introducing students to hardwoods and plywoods.

Written by **Bob Hunter** with **Paul Meisel**

Once a teacher, always a teacher

Although you might not know Paul Meisel, you might recognize his name. Paul owns and operates Meisel Hardware Specialties, selling hardware, tools, wood, supplies, and project plans from his catalog, Web site, and store in suburban Minneapolis.

It was while teaching industrial arts 30 years ago that Paul realized his knack for designing projects with straight-forward construction that had high appeal even beginning woodworkers could manage. "Pretty soon, other industrial-arts teachers were calling, wanting my project plans." he chuckles. "I thought, 'Wouldn't it be great to just design projects and sell the plans?' So I quit teaching, and started Meisel Hardware Specialties." Today, his company has more than 3,000 project plans, as well as hard-to-find hardware.

You can purchase a hardware parts package, which contains everything needed to build all seven projects (kit #3063, $20), by calling 800-441-9870 or at meiselwoodhobby.com.

Photo-Frame Catchall Box

This easy-to-build box displays up to 10 favorite photos and provides a convenient place for everything from a deck of cards and coasters to envelopes and stamps to pocket change and earrings.

PROJECT HIGHLIGHTS

- Overall dimensions: 13" wide × 9¼" deep × 4½" high.
- Making the lid and bottom from MDF avoids wood movement problems. Make the entire box from MDF, or use hardwood cutoffs for the box frame.

Skill Builders

- Learn a foolproof method for mortising hinges and aligning a box lid.
- Boxes make perfect gifts, so we'll show you a time-saving way to make multiple lids. See *page 26*.
- When it's time to apply the finish, think outside the box. Try one of the decorative finishes shown on *page 32*.

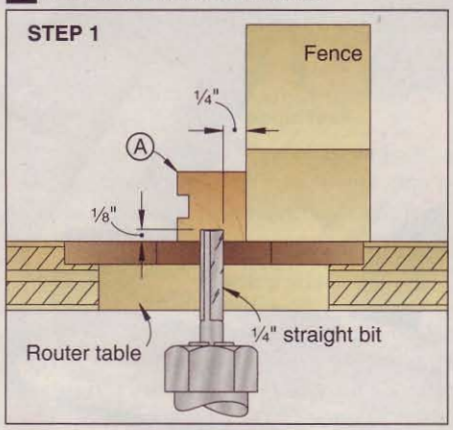
Start with the box frame

1 To make the corners (A), cut a ¾×¾×15" blank. Then rout grooves [**Drawing 1**, **Step 1**], and round over one corner [**Step 2**]. Capture the blank with an auxiliary fence to keep it from rotating when routing the round-over. Use a pushstick in both steps. Finish-sand the blank, and cut the corners to finished length [**Materials List**, *page 75*].

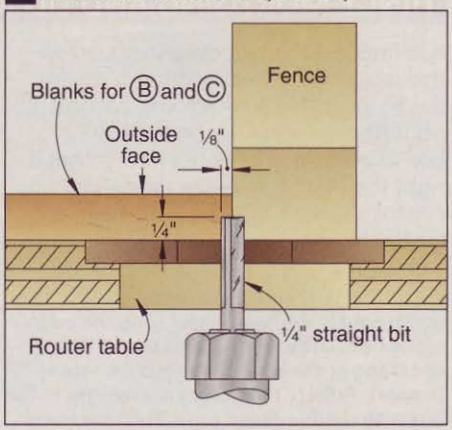
2 For the front and back (B), cut a ½×6¼×11" blank. For the sides (C) cut a ½×6¼×7¼" blank. Chuck a ¼" straight bit into your table-mounted router. Rout a ⅛" rabbet ¼" deep along the edge of a ½"-thick scrap, and test the fit in the corner (A) grooves. Make any adjustments, and then rout rabbets along both ends of each blank on what will be the inside faces of the parts [**Drawings 2** and **3**]. Use a follower block to keep the blanks square to the router-table fence and to prevent chip-out. Now rip two parts from each blank to finished width, and finish-sand them.

Placing two photos back-to-back between acrylic panes allows you to display five additional photos on the inside of the lid.

1 FORMING THE CORNERS



2 RABBET THE FRONT, BACK, AND SIDES



3 Glue and clamp two corners (A) each to the front and back (B). With the glue dry, glue and clamp the sides (C) between the front and back assemblies. Check the box frame for square, and make sure it sits flat.

4 For the long trim (D) and short trim (E), cut a ½×2×19" blank. Then rip four ¼"-wide strips from the edge of the blank. (You'll get one part D and one part E from each strip.) Finish-sand the strips. Next, using a sharp pencil or a marking knife, mark trim lengths to fit between the corners (A), and cut the parts to length. Now glue and clamp the trim in place [**Drawing 3**]. Ease only the top edges of the box frame with a sanding block.

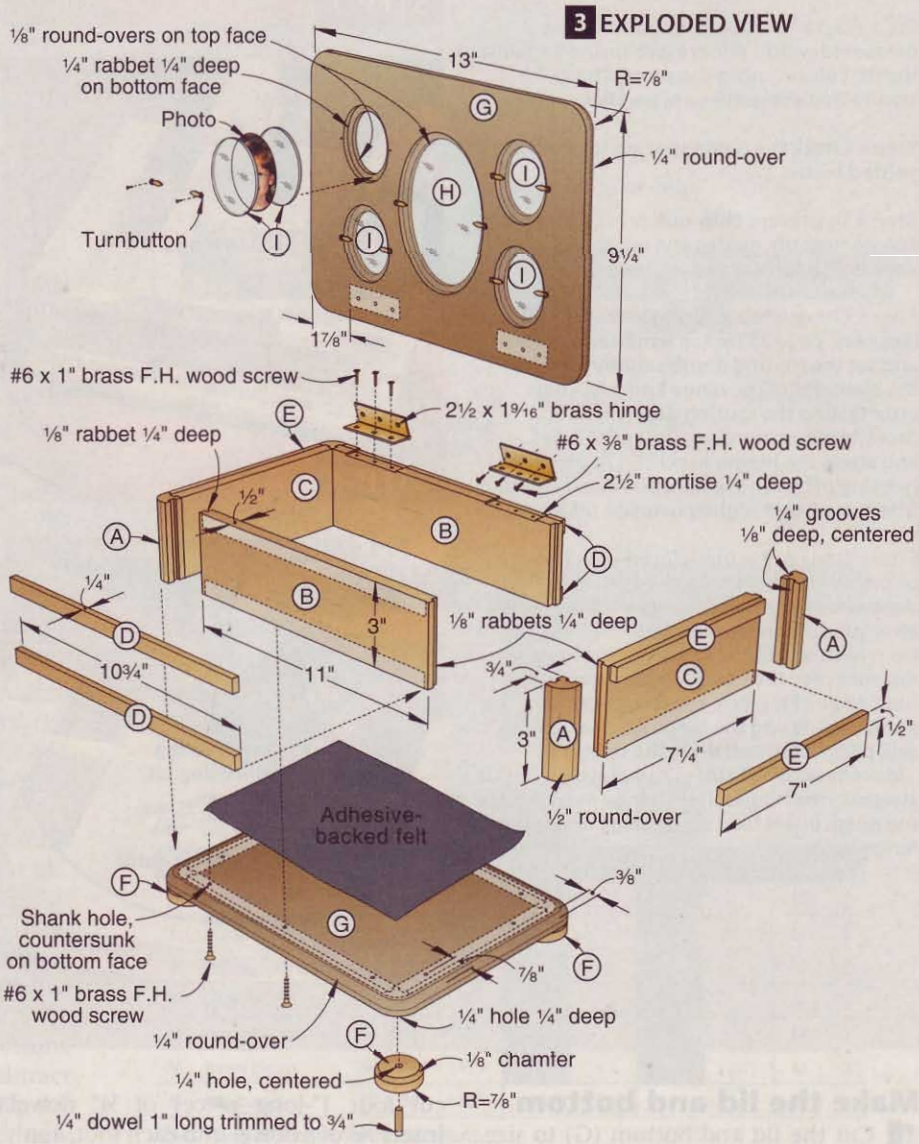
Form the feet

1 For the feet (F), start with a ½×5×12" blank. (You'll use an adjustable circle cutter to make the feet. This size blank allows you to clamp it to the drill-press table without interfering with the circle cutter.) Then, to form the ⅛" chamfers, chuck an adjustable circle cutter into your drill press. Orient the cutter and adjust the beam to cut a ⅞"-radius *hole* [**Drawing 4, Step 1**]. Now cut ⅛" deep into the blank. Repeat three times to form the chamfers on four feet.

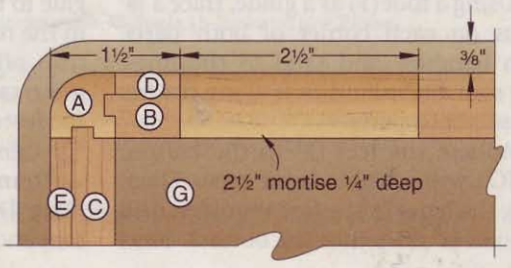
2 Reposition the cutter and adjust the beam to cut a ⅞"-radius *circle* [**Drawing 4, Step 2**]. Then, with the circle cutter drill bit in the previously drilled center hole, cut the feet. To eliminate tear-out, cut the feet ⅜" deep from the top face, flip the blank, and complete the cuts from the bottom face.

3 To finish-sand the feet, use a ¼×2" roundhead bolt and nut as a mandrel, and spin the feet on your drill press. To keep the edges and bevels crisp, use a sanding block.

3 EXPLODED VIEW



3a HINGE MORTISE DETAIL



HINGE MORTISING AND LID INSTALLATION IN 6 EASY STEPS

You finished the woodworking part of making a box. Now it's time to mount the hinges. This is where you can get it right or mess it up. Using the catchall box as an example, here's how to get it right the first time, every time. (The photos show an all-MDF box we made for the finishing article on *page 32*.)

Step 1 Cut two ½×1½×10" outer guides. The width equals the hinge inset from the edge of the box. The length allows about 1½" overhang at the back of the box for router support. Adhere the guides and hinges to the box with double-faced tape. Then measure the distance between the hinges.

Step 2 Cut a ½×10" center guide to the measured width. Adhere it to the box against the first hinge, using the second hinge to ensure that the guides are parallel.

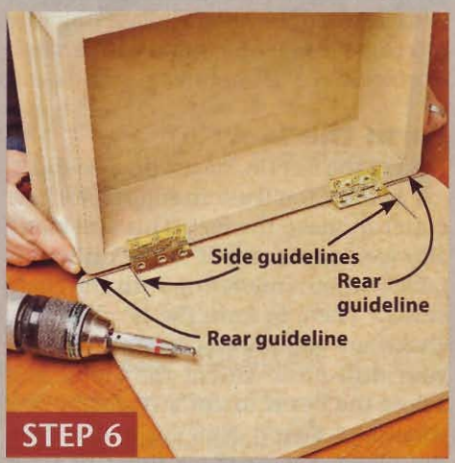
Step 3 Check the guide spacing for the second hinge.

Step 4 To prevent chip-out, press a fine-tooth saw against the guides and cut shallow saw kerfs at the corners of each hinge mortise.

Step 5 Chuck a top-bearing mortising bit [**Sources**, *page 75*] into a handheld router, and set the routing depth slightly less than the diameter of the hinge knuckle. Then, after testing the routing depth in scrap, rout the hinge mortises. Drill pilot holes, and screw the hinges in place. (To prevent twisting off screws in hardwood and splitting fiberboard, drill slightly oversize pilot holes.)

Step 6 Draw a rear guideline on the bottom of the lid ⅜" from the back edge (the dimension the lid overhangs the box frame all around). Then draw side guidelines 1⅞" from each end of the lid (the hinge inset distance plus the overhang). Now align the back edge of the box and the hinges with the guidelines. Using the hinge holes as guides, drill pilot holes, and drive the screws.

Make sure the lid closes completely without stressing the hinges. If the hinge mortises are too deep, insert card stock shims under the hinge leaves.



Make the lid and bottom

1 Cut the lid and bottom (G) to size. Using a foot (F) as a guide, trace a ⅞" radius on each corner of both parts. Then bandsaw and sand to the lines. Now rout a ¼" round-over along the top edges of both parts.

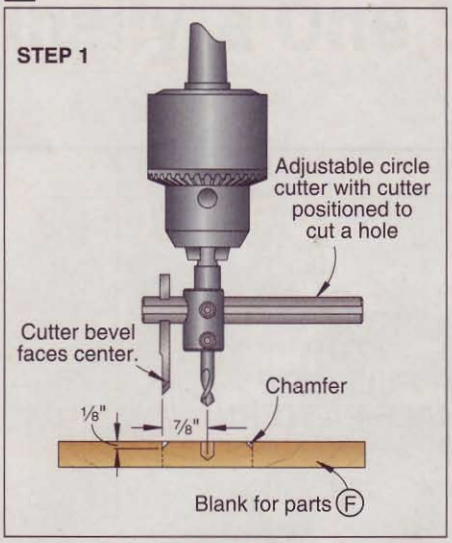
2 Adhere the feet (F) to the bottom (G) with double-faced tape. Then, using the holes in the feet as guides, drill ¼" holes ¼" deep into the bottom. Next cut four 1"-long pieces of ¼" dowel. Insert ⅜" of a dowel into each foot, apply glue to the protruding length, and tap it in the rest of the way. With the glue dry, trim off the excess dowel with a fine-tooth saw, and sand it flush. Now remove the feet.

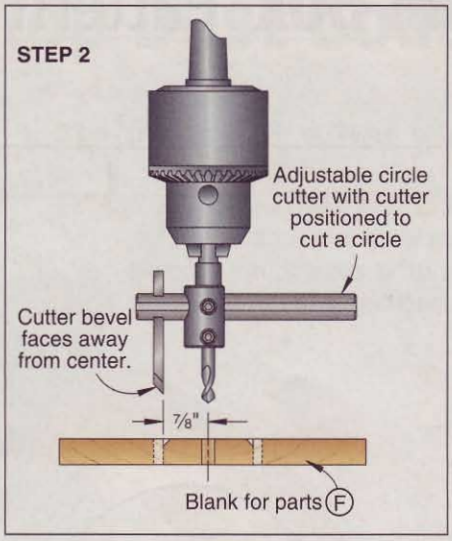
3 Center the bottom (G) on the box frame (A/B/C/D/E), and clamp it in place. Drill screw holes through the bottom and into the front and back (B) and sides (C) [**Drawing 3**]. (For the #6 screws in this project, drill 9/64" shank holes and 3/32" pilot holes.) Drive the screws.

4 To rout the hinge mortises [**Drawings 3** and **3a**] and attach the lid (G), see the sidebar *above*. Then remove the lid and hinges.

5 To turn the lid (G) into a multi-photo frame, make four photocopies of the lid half-pattern on *page 76*. Cut and match the patterns, where indi-

4 MAKING THE FEET




STEP 2
Adjustable circle cutter with cutter positioned to cut a circle
Cutter bevel faces away from center.
7/8"
Blank for parts F

cated, to make two full patterns. Set one pattern aside and adhere the other pattern to the lid with spray adhesive. Then drill blade-start holes and jigsaw or scrollsaw and drum-sand the openings to shape. (For a speedy way to make multiple lids, see *page 26*.)

6 Chuck a ¼" rabbet bit into your table-mounted router, and rout rabbets along the bottom edges of the five oval cutouts [**Drawing 3**]. Switch to a ⅛" round-over bit, and rout round-overs along the top edges. Drill pilot holes for the turnbutton screws where indicated on the pattern. Finish-sand the lid.

7 To make the large panes (H) and small panes (I), tape together two ⅛×8×10" pieces of acrylic face-to-face. Retrieve the unused pattern and adhere it to the top piece. Jigsaw or scrollsaw and sand the panes to shape. Test-fit the panes, sanding the edges as needed.

Finish and assemble

1 Remove the bottom (G) from the box frame. Inspect all the parts and finish-sand, where needed. Then apply a stain, if desired, and a clear finish to the box body. (We applied Varathane Traditional Cherry no. 445 stain, and two coats of satin polyurethane, lightly sanding with 220-grit sandpaper between coats.) For the leather-look finish on the lid and bottom, and two additional decorative finishing options, see *page 32*.

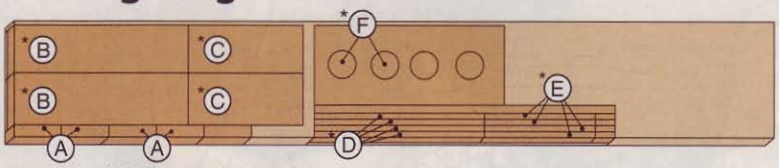
2 Lightly adhere a 7½×11¼" piece of adhesive-backed felt to the bottom (G), aligning the edges of the felt with the screw holes in the bottom. (Find adhesive-backed felt in crafts supply stores.) Then screw the box frame (A/B/C/D/E) in place. Next, guiding a crafts knife along the inside faces of the back and front (B) and sides (C), cut through the felt. Now remove the box frame, and peel away the excess felt. Firmly press the remaining felt in place.

3 Screw the bottom (G) to the box frame. Then glue the feet (F) in place. Now reinstall the hinges.

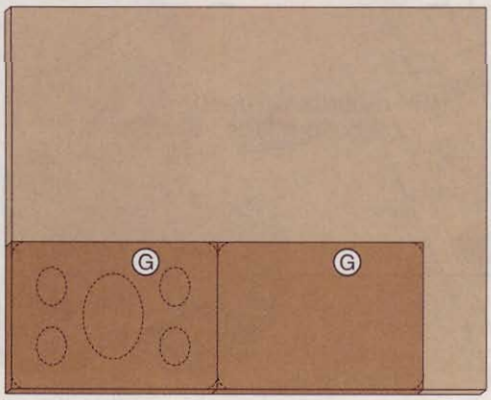
4 Screw the turnbuttons into place. Place one pane (H, I) into each opening, and insert two photos back-to-back. Place the second panes, and secure them with the turnbuttons.

Written by **Jan Svec** with **Jeff Mertz**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

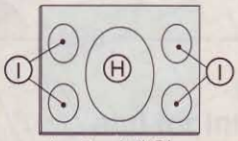
Cutting Diagram



¾ x 7¼ x 48" Cherry (2.7 bd. ft.)
*Plane to the thickness listed in the Materials List.



½ x 24 x 30" Medium-density fiberboard



⅛ x 8 x 10" Clear acrylic (2 needed)

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	corners	¾"	¾"	3"	C	4
B*	front and back	½"	3"	11"	C	2
C*	sides	½"	3"	7¼"	C	2
D*	long trim	¼"	½"	10¾"	C	4
E*	short trim	¼"	½"	7"	C	4
F*	feet	½"	1¾" diam.		C	4
G	lid and bottom	½"	9¼"	13"	MDF	2
H	large panes	⅛"	4"	5½"	A	2
I	small panes	⅛"	2¼"	2¾"	A	8

*Parts initially cut oversize. See the instructions.

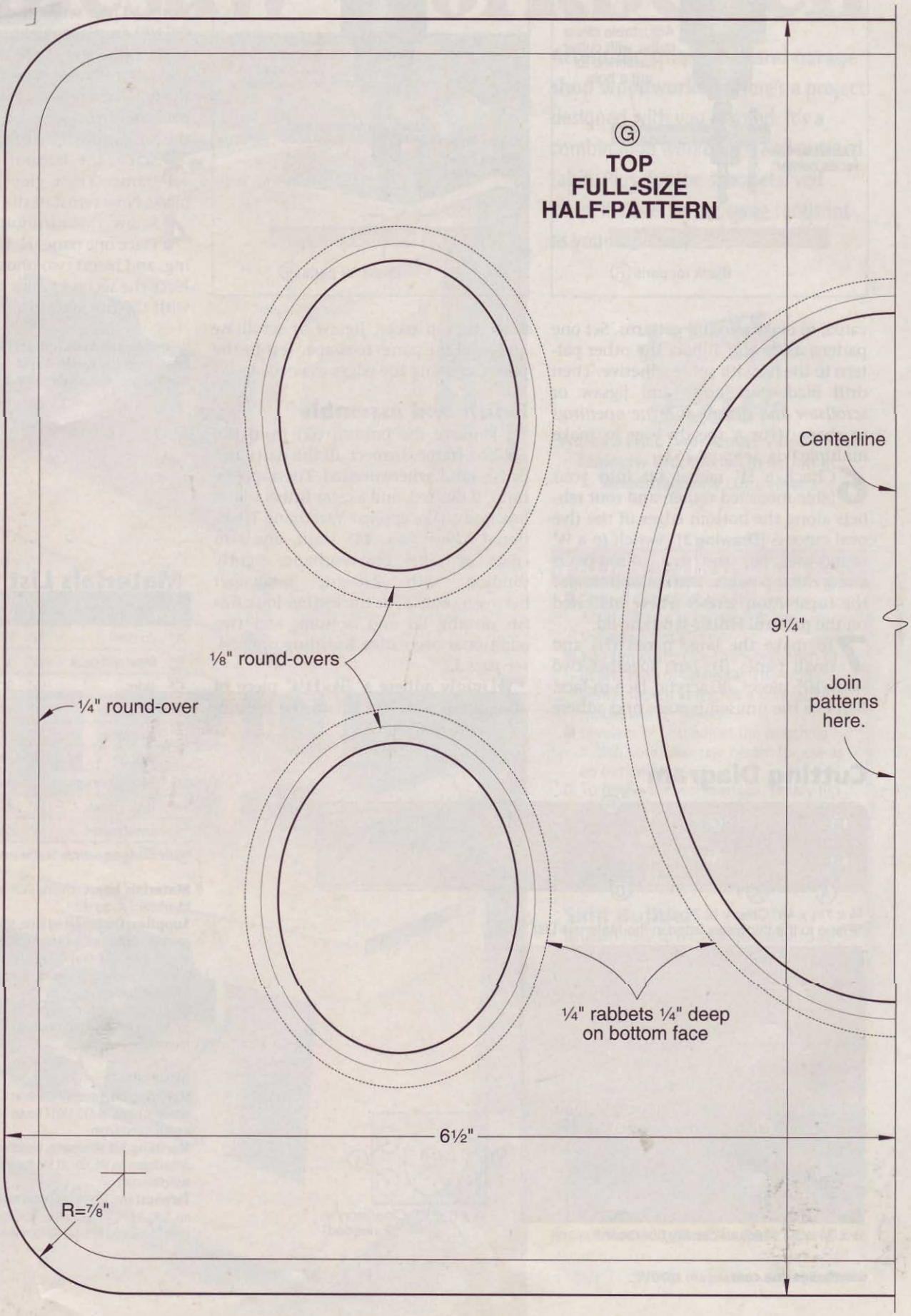
Materials key: C–cherry, MDF–medium-density fiberboard, A–acrylic.
Supplies: Double-faced tape, spray adhesive, ¼×2" roundhead bolt and nut for sanding mandrel, ¼" dowel, 2½×1 9/16" brass hinges (2), #6×⅜" and #6×1" brass flathead wood screws, turnbuttons (20), 7½×11¼" adhesive-backed felt.
Bits: Adjustable circle cutter; ¼" straight, ⅛", ¼", and ½" round-over, ¾" top-bearing mortising, and ¼" rabbet router bits.

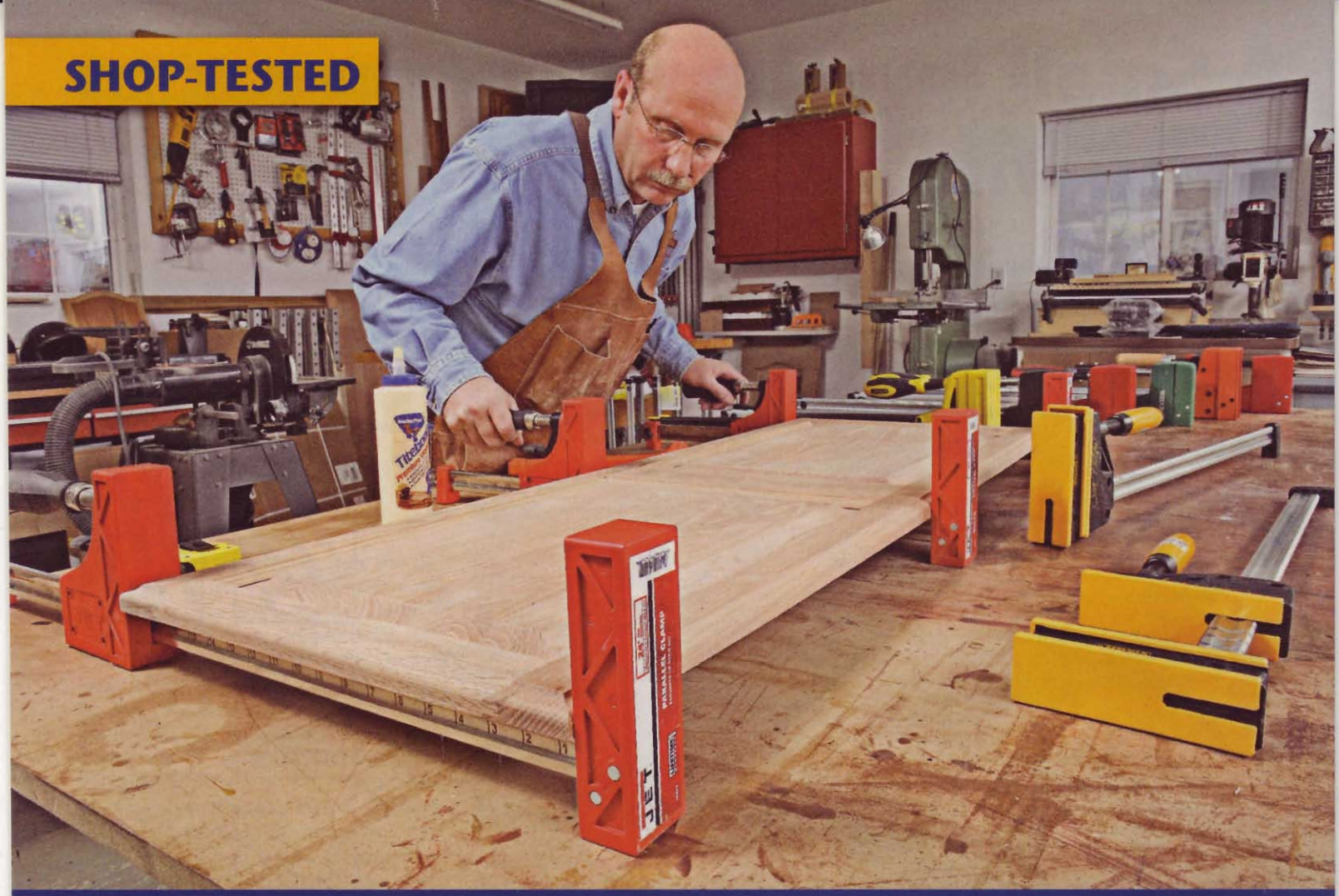
Sources

Mortising bit. Freud ¾"-diameter x ⅜"-long top-bearing mortising bit no. 16-510, $19.17. Router Bit World, 800-630-2260, routerbitworld.com.
Mortising-bit alternate. Woodline ¾"-diameter x 7/16"-long dado cleaner no. WL-1011-D, $16. Woodline USA, 800-472-6950, woodline.com.
Turnbuttons. 13/16" brass-plated turnbuttons with screws no. 6293, $2.49 (pack of 20) or $9.95 (pack of 100). Meisel Hardware Specialties, 800-441-9870, meiselwoodhobby.com.

Catchall Box Pattern

The pattern on this page accompanies the project article on *page 72*. You'll need four photocopies of this page. Cut and join the patterns, where indicated, to make two full patterns.





Parallel-Jaw Clamps

We tested 8 models and found they all do a good job on most glue-ups. But it's the subtle differences and features that pinpoint the leaders.

Woodworkers long for parallel-jaw clamps the way kids yearn for the latest video game. With steel-reinforced, resin-covered jaws 3" to 4" deep that tighten up parallel to each other, beefy steel bars, heavy-duty handles and screws, and loads of clamping strength, these clamps have gained a reputation for high performance *and* prices that keep hobbyists at a distance. But is that a fair characterization?

With three new entries—Harbor Freight, Stanley, and Woodcraft—joining Bessey, Jorgensen, Gross Stabil, and Jet in this category in recent months, and with Bessey modifying its pioneering K-Body clamp, we decided to sort them out in a head-to-head test. (Woodcraft manufactures its clamps under license from Bessey, so they closely resemble the K-Body. Bessey now offers two types of handles: the traditional wood and a new rubber-inlaid plastic.) For each make, we tested 24" models and either a 48" or 50" version.

We had to ask: Do they *really* clamp parallel?

The ability of the jaws to remain parallel under pressure separates these clamps from other styles. To test this, we clamped equal-length 2×6s on edge in each set of clamps, and then measured the distance at three places between the jaws: at the bar, in the center, and at the tip. Of the 24" clamps, six (both Besseys, Gross Stabil, Jet, Stanley, and Woodcraft) remained parallel. Harbor Freight and Jorgensen's CabinetMaster deflected 1/16".

Among the longer 48" and 50" clamps, only the Jorgensen remained parallel. Most clamps deflected 1/16"; Woodcraft's clamp was off by 1/8".

So what to make of it? We also tested a few other types of clamps (one-handed bar clamps, pipe clamps, and aluminum bar clamps) and found their jaws canted more than the parallel-clamp jaws. Given the deep jaws of the parallel clamps—all

at least 3⅜"—we found 1⁄16" of deflection to be acceptable. That did not affect a glue-up where the full length of the jaw made contact with the assembly.

Some sliding jaws work the bar better than others

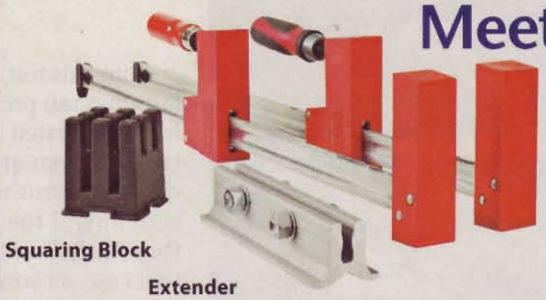
All of the clamps have a fixed jaw at one end of the bar and a sliding jaw that travels along the bar. On all models except Jet, that jaw often slides uncontrollably down the bar, crashing into the fixed jaw when held vertically. Jet's "lockable" jaw fixes and releases with a finger-trigger below the handle, as shown *below*. This system engages the bar reliably, with no backsliding when tightening the jaw.

Stanley's jaw fits its I-beam bar so well, it tightens without fail—second only to the Jet—yet slides smoothly when you want to move it. Jorgensen's smooth bar—all the others have small serrations perpendicular to the bar—resulted in the jaw backsliding about half the time when we tightened the handle. Gross Stabil's jaw has an additional brace that wraps around the bar and tracks behind the jaw fixture. This provides better leverage for tightening, but proves difficult to slide along the bar.

Half of the clamps (Harbor Freight, Woodcraft, and both Besseys) use set screws to engage the serrations on the top and bottom of the bar while you tighten the handle. However, all four crept backward more than half the time as we applied force to the assembly.

Lift on Jet's trigger to disengage the clutch and slide the head; release, and it locks into the serrations on top of the bar.

Meet the Clamps



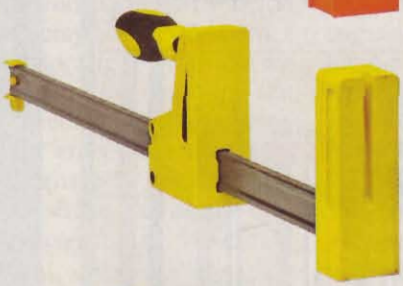
Bessey (synthetic and wood handles)
24", $32; 50", $40
800-828-1004
besseytools.com

Gross Stabil
24", $29; 48", $39
800-828-1004
grossstabilclamps.com

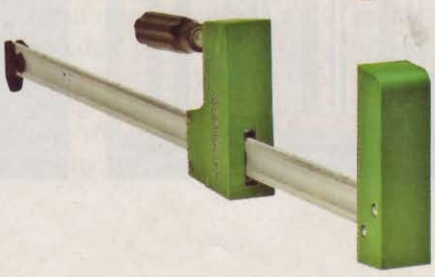
Harbor Freight
24", $30; 36", $35
800-423-2567
harborfreight.com

Jet
24", $35; 50", $47
800-274-6848
jettools.com

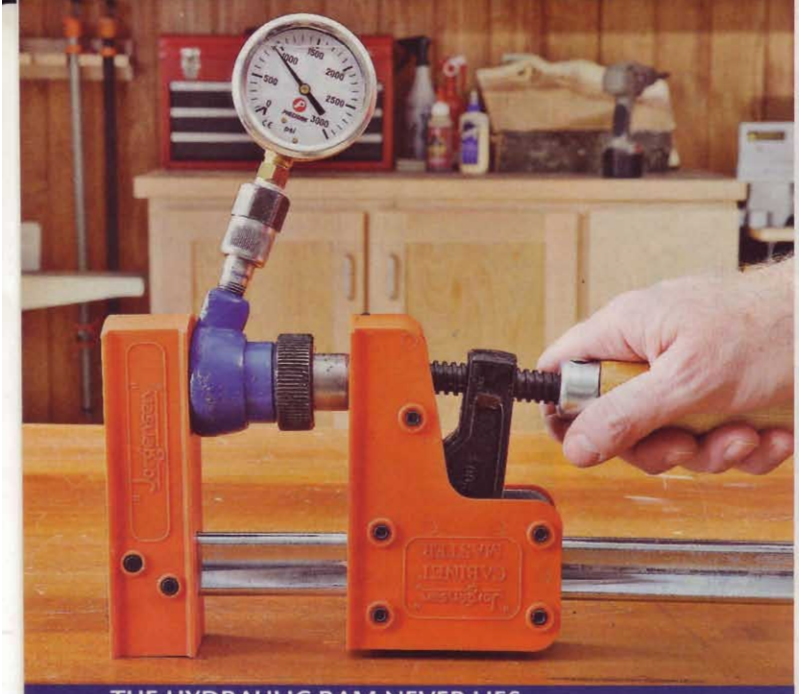
Jorgensen CabinetMaster
24", $33; 48", $40
312-666-0640
adjustableclamp.com



Stanley
24", $34; 48", $42
800-782-6539
stanleytools.com



Woodcraft
24", $28; 50",$40
800-225-1153
woodcraft.com



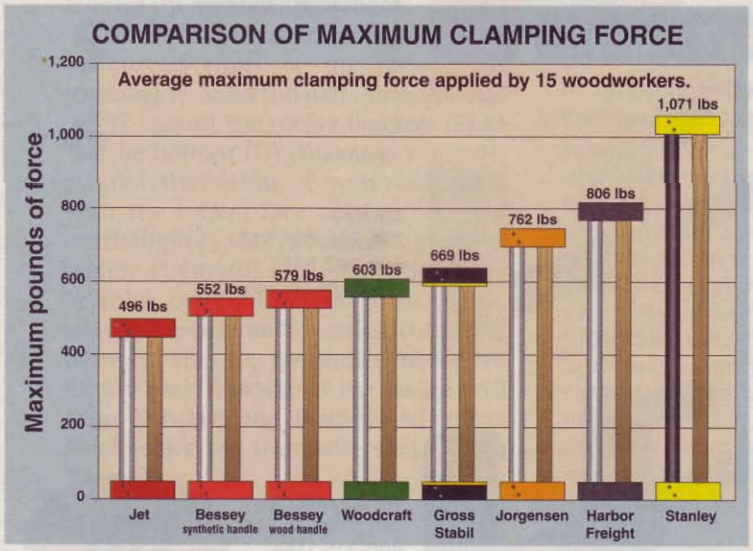
THE HYDRAULIC RAM NEVER LIES

We tested each 24" clamp to find its maximum clamping strength, then converted those PSI ratings to pounds of force.

Crank up the clamping power—but only when you need it

Despite the advantages some clamps have over others in engaging the bar, ultimately they all were able to pull together everything we tried in our tests. So we staged a "strongest clamp" competition to sort out the pecking order. Using a small hydraulic ram with a dial gauge, we had 15 woodworkers of varying ages max out each clamp, as shown *above*. We multiplied the pounds-per-square-inch (PSI) readings by the surface area of the ram (1.08") to find the pounds of force. Then we averaged the results, as shown in the chart *below*.

Stanley's clamp overwhelmingly ruled the strength showdown, due in large part to its triangular-shaped rubber and plastic handle that was the largest (in diameter) among the test group. But large handles did not always equate to strength, as Jet, with the second-largest handle, delivered the lowest average force. Meanwhile, Harbor Freight finished second-best, outdistancing the Bessey and Woodcraft models, with similar bar configurations.



From this test, we concluded two things. First, although the rankings ran pretty true from person to person, the amount of force generated dropped off noticeably for the older testers, two of whom are older than 60 and have arthritic hands. So while someone might be able to achieve results similar to ours with any of the clamps at a younger age, as they grow older, they likely won't be able to crank them as tightly as before. In that case, a clamp with more power capability might be best.

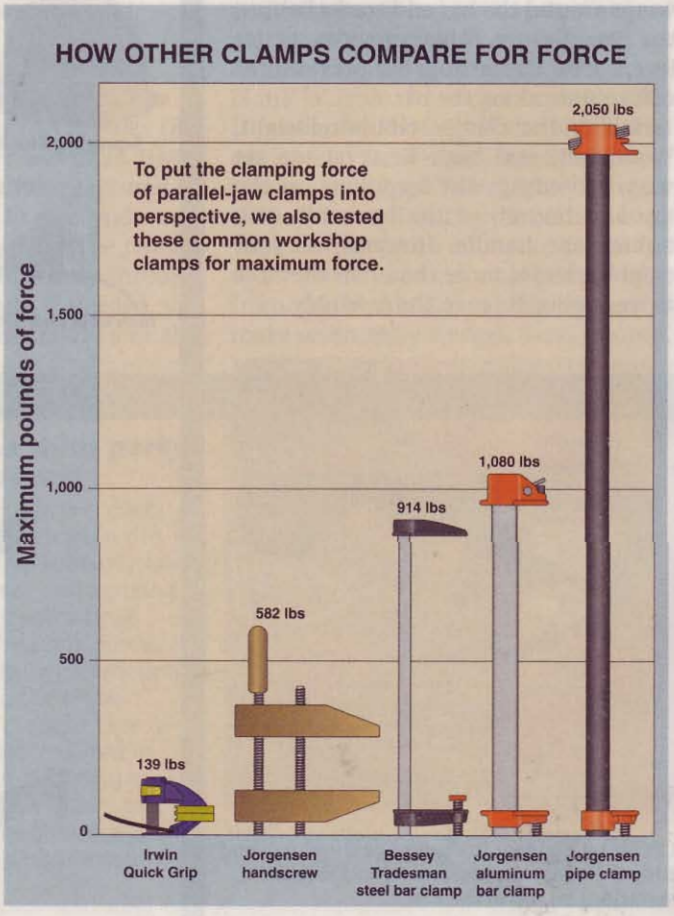
The second thing we learned in testing was that all the clamps create more than enough force for most glue-ups. Dale Zimmerman of Franklin International (maker of Titebond glues) says that 100 pounds of force proves adequate to pull together a well-machined glue joint.

Rarely do we need more than moderate clamping force to secure a project, but occasionally we do need oodles of force. Cold-bending wide, laminated workpieces around a form, for example, requires more force, and the deep jaws of a parallel clamp excel here.

Unique features add distinction among the clamps

■ Jet's printed scale on the side of its bar allows you to preset the jaw opening more precisely to avoid that "Oh, nuts!" moment when you try to put a glued-up assembly into a too-small opening.

■ End stops on the Jet and Jorgensen clamps (shown on *previous page*) move anywhere along the bar. We found this helpful when the bar was longer than our worksurface. Just slide the end stop to a spot where it will rest on the bench, and the bar can extend beyond. This keeps the sliding jaw from dragging on your benchtop. They also serve as stops for repositioning the sliding jaw for multiple glue-ups of similar dimensions.



■ The Bessey and Jet models offer plastic squaring blocks as options with single clamps, but are included with four-clamp kits. The blocks enable you to crisscross clamps exactly 90° to each other and can be secured to a worksurface with screws. These come in handy when clamping carcases, frames, or doors that need to be square. (Woodcraft's Peter Collins said the company will have squaring blocks by early fall 2007.)

■ Jet offers bench dogs as accessories that thread into the underside of the fixed jaw and end stop so you can anchor them to your benchtop's dog holes.

■ Bessey's optional extender allows you to couple two clamps end to end, using the fixed jaw on one, and the sliding jaw reversed as a spreader on the other.

We say buy the clamp that gives you more bang for the buck

Without huge differences in price or performance, we'd buy the clamps that are most user-friendly. Jet's parallel clamps—our choice for Top Tool—have large jaws, large handles, trigger-activated clutches, sturdy bars with scales in inches, movable end stops, and optional squaring blocks and bench dogs. Jet clamps are heavier than most and came out on the low end for clamping force, but still proved adequate for every clamping chore we tried.

You can save money and still get great performance with the Woodcraft clamps, our Top Value. With a $7 difference per clamp for both 24" and 50" models, you get five Woodcraft 24" clamps for the price of four similar Jet clamps.

Written by **Bob Hunter** with **Randy Zimmerman**
Illustrations by **Tim Cahill; Lorna Johnson**

Don't stain your wood until you intend to

Jorgensen's polished steel bar proved resistant to staining wood (top) when it contacted yellow glue. Conversely, Stanley's black steel bar made stains that penetrated the wood surface (bottom) and had to be removed with a planer. The other clamps stained the wood to lesser degrees but could be sanded away.

Irwin launches new parallel clamps

Irwin Industrial Tools, maker of Quick Grip one-hand bar clamps, released a line of parallel clamps just as we were putting the finishing touches on this article. Irwin's Melissa Gambrill said they have 24" ($35) and 48" ($40) models. Because of the timing, we were not able to test them for this issue.

THE STRAIGHT AND NARROW ON PARALLEL-JAW CLAMPS

BRAND	BAR SIZE (THICKNESS x WIDTH), INCHES	THROAT DEPTH, INCHES	JAWS: WIDTH, INCHES	JAWS: SCREW LENGTH, INCHES	JAWS: SIZE (LENGTH x DIAMETER), INCHES	HANDLE: MATERIAL (1)	PERFORMANCE RATINGS (2): JAW PARALLELISM UNDER PRESSURE	PERFORMANCE RATINGS (2): SLIDING JAW, EASE OF USE	PERFORMANCE RATINGS (2): HANDLE, EASE OF USE	PERFORMANCE RATINGS (2): EASE OF REMOVING DRIED GLUE FROM BARS	PERFORMANCE RATINGS (2): STAINS FROM GLUE/METAL INTERACTION	ACCESSORIES (3): STANDARD	ACCESSORIES (3): OPTIONAL	WEIGHT, POUNDS (4): 24" CLAMP	WEIGHT, POUNDS (4): 50" CLAMP (5)	COUNTRY OF ASSEMBLY (6)	WARRANTY, YEARS (7)	SELLING PRICE (8): 24" CLAMP	SELLING PRICE (8): 50" CLAMP (5)
BESSEY K-BODY *(WOOD HANDLE)*	3/8 × 1 1/8	3 3/8	1 7/16	1 3/16	4 3/8 × 1 1/8	W	A-	B	C	C	B-		B*,E	5.3	7.1	U	L	$32	$40
BESSEY K-BODY *(SYNTHETIC HANDLE)*	3/8 × 1 1/8	3 3/8	1 7/16	1 5/16	5 1/8 × 1 5/16	C	A-	B	A	C	B-		B*,E	5.6	7.4	U	L	$32	$40
GROSS STABIL PC2	3/8 × 1 1/8	3 5/8	1 3/4	1 13/16	4 3/4 × 1 3/16	W	A-	C+	B-	C	C+	J		5.1	8.6*	G	L	$29	$39*
HARBOR FREIGHT	3/8 × 1 1/8	3 3/8	1 7/16	1 3/8	4 3/8 × 1 1/8	A	B	C	B	C	C			5.6	6.8**	I	30 DAYS	$30	$35**
JET	3/8 × 1 1/8	4 3/16	1 13/16	1 11/16	5 × 1 1/2	C	A	A	A	B	B-	S	B*,D*	6.7	9.0	C	L	$35	$47
JORGENSEN CABINETMASTER	3/8 × 1 3/16	4	1 7/8	1 13/16	4 9/16 × 1 3/8	W	A	B	B+	B+	A	S		6.1	9.4*	U	1	$33	$40*
STANLEY	3/8 × 1 3/16	3 11/16	1 13/16	1 5/8	4 7/8 × 1 11/16	C	A-	C	A	B	D			6.3	8.7*	C	L	$34	$42*
WOODCRAFT	3/8 × 1 1/8	3 3/8	1 7/16	1 1/4	4 3/8 × 1 1/8	A	B+	C	B-	C	B		B	4.1	7.4	I	1	$28	$40

1. (A) Aluminum
   (C) Combination: plastic and rubber
   (W) Wood

2. A Excellent
   B Good
   C Fair
   D Poor

3. (B) Squaring blocks
   (D) Bench dogs
   (E) Clamp extenders
   (J) Replaceable jaw pads
   (S) Movable end stop
   (*) Included with multiple-clamp kits.

4. Average of four clamps

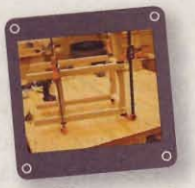
5. (*) 48"-long clamp
   (**) 36" clamp is longest made by Harbor Freight

6. (C) China
   (G) Germany
   (I) India
   (U) United States

7. (L) Lifetime

8. Prices current at time of article production and do not include shipping where applicable. Prices are for single clamps; some retailers offer quantity discounts.

Indoor & Outdoor Bistro Stool

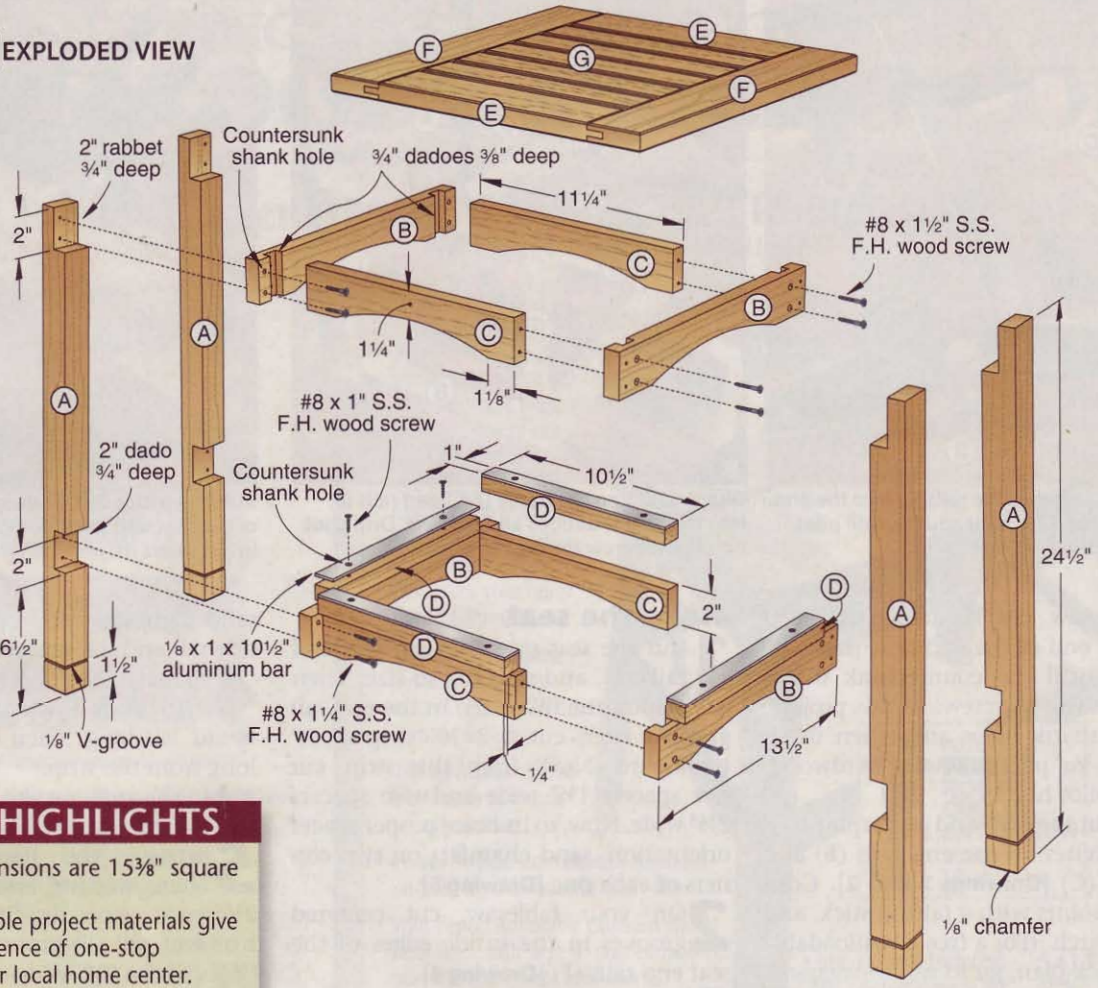


View a slide show of six additional Bistro Stool assembly photos at woodmagazine.com/slides.

Bistro Table

This project perfectly complements the outdoor Bistro Table featured in the previous issue (July 2007). The stools employ the same simple construction as the table, so you can knock out a set in a weekend.

1 EXPLODED VIEW



PROJECT HIGHLIGHTS

- Overall dimensions are 15⅜" square × 25¼" high.
- Readily available project materials give you the convenience of one-stop shopping at your local home center.
- Simple joinery and repetitive cuts mean you can pick up materials on Saturday morning and have four stools ready to finish by Sunday afternoon.
- For the board feet of lumber and other items needed to build one stool, see *page 85*.

Skill Builder

- Learn an easy way to form a row of closely spaced mortises by cutting a groove and using fillers.

Build the base

1 For the legs (A), cut two 25"-long pieces of 2×4. (We used cedar.) Then joint one edge of each 2×4 square, and cut four 1½"-wide leg blanks. Trim the legs to finished length [**Materials List**, *page 85*].

Note: *For interior use, make the stool from the wood species of your choice. For an alternate material suggestion for exterior use, see the sidebar at* right.

2 With a dado blade in your tablesaw, cut a 2" dado ¾" deep and a 2" rabbet ¾" deep in each leg (A) [**Drawing 1**].

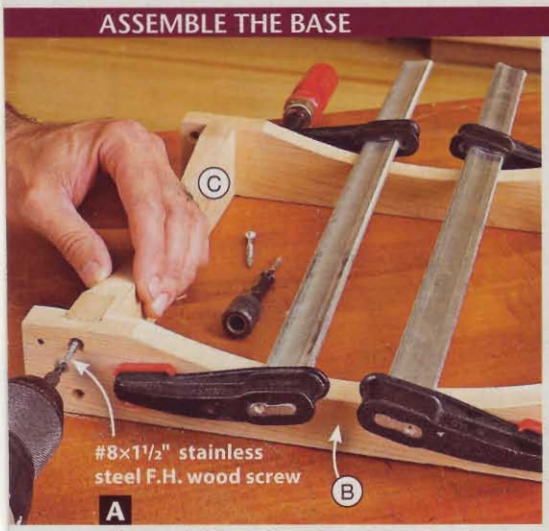
3 To form the decorative grooves near the bottom of each leg (A) [**Drawing 1**], chuck a V-groove bit into your table-mounted router, and position the fence as a stop, 1½" from the bit center. Then using a follower block to keep the leg square to the fence and prevent chip-out, rout the grooves. Now reposition the fence, and use the same bit to rout ⅛" chamfers along the bottom end of each leg. Finish-sand the legs.

4 Cut the end rails (B) and side rails (C) to size. With a dado blade in

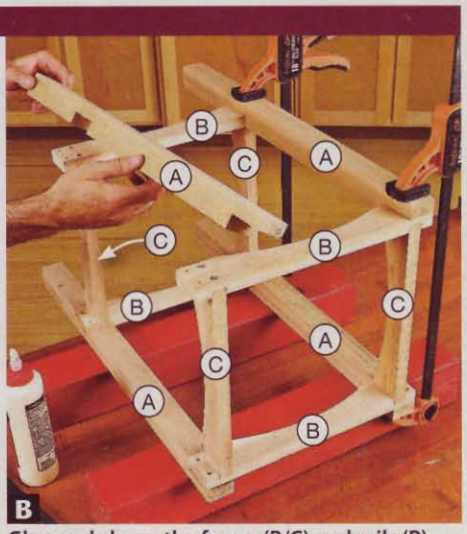
Cedar vs. white oak: You decide

We made our stools from cedar to match the bistro table in the previous issue. But because white oak is a good alternative for outdoor use, we made the stool at *right* in this harder, heavier species. Here are some points to ponder when choosing between cedar and white oak for your stools.

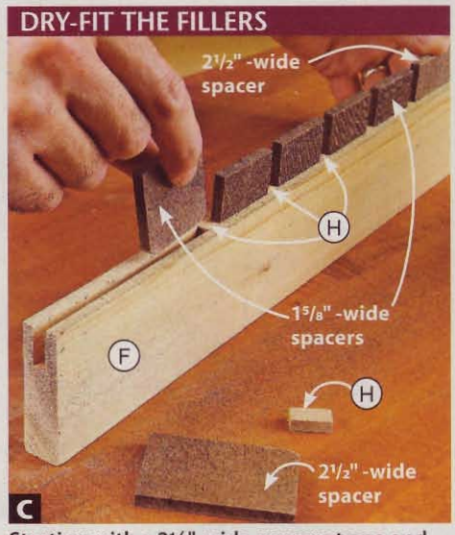
- **Weatherability:** A draw; both are rated as resistant or very resistant to decay.
- **Durability:** When it comes to dent resistance and screw-holding ability, white oak wins. If you make your bistro stool from white oak, eliminate the aluminum rail cap protectors as shown at *right*.
- **Cost:** Cedar has the edge here. And you'll find it at your local home center or lumberyard. You'll have to purchase white oak from a hardwood dealer.
- **Weight:** The cedar bistro stool weighs in at 7¼ lbs; white oak at 15½ lbs. While this makes the cedar stool easier to move, the white oak stool would be less likely to tip over in the wind.



Glue and clamp the side rails (C) into the end rail (B) dadoes. Check for square, drill pilot holes, and drive the screws.



Glue and clamp the frame (B/C) end rails (B) into the leg (A) dadoes and rabbets. Drill pilot holes, and screw the legs in place.



Starting with a 2½"-wide spacer at one end of the seat end rail (F) groove, alternately insert fillers (H) and 1⅝"-wide spacers.

your tablesaw, cut ¾" dadoes ⅜" deep near each end of the end rails [**Drawing 2**]. Then drill the countersunk shank holes. (For the #8 screws in this project, drill 5/32" shank holes and when using softwood, 3/32" pilot holes. For hardwood, drill 7/64" pilot holes.)

5 Lay out the end- and centerpoints of the arches on the end rails (B) and side rails (C) [**Drawings 1** and **2**]. Connect the points with a fairing stick, and draw the arch. (For a free downloadable fairing-stick plan, go to woodmagazine.com/fairing.) Bandsaw and sand the arches. Finish-sand the rails.

6 Assemble the two frames (B/C) and add the legs (A) to form the base [**Photos A** and **B**]. Then cut the rail caps (D) to size, and glue and clamp them to the bottom end rails (B) and side rails (C), flush at the inside edges [**Drawing 1**]. (Use polyurethane glue or an exterior-grade wood glue, such as Titebond II or Titebond III.)

Make the seat

1 Cut the seat side rails (E), seat end rails (F), and slats (G) to size. Then to position the fillers (H) in the end rail grooves later, cut a 2×16" strip of ¼" hardboard. Next, from this strip, cut five spacers 1⅝" wide and two spacers 2½" wide. Now, to indicate proper spacer orientation, sand chamfers on two corners of each one [**Drawing 3**].

2 On your tablesaw, cut centered grooves in the inside edges of the seat end rails (F) [**Drawing 4**].

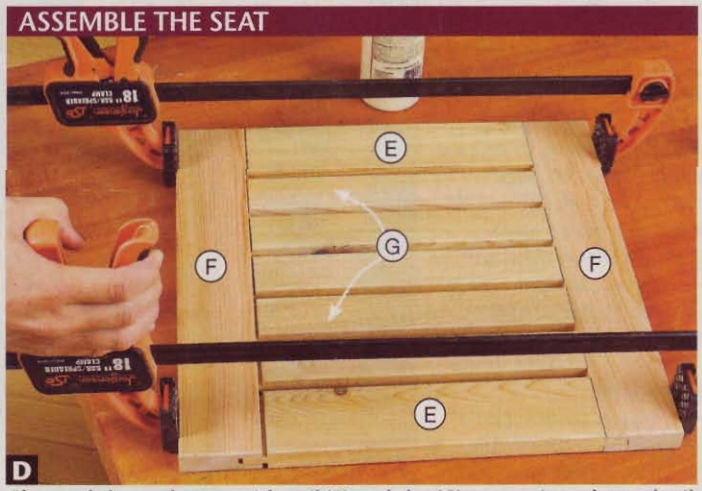
3 With a dado blade in your tablesaw, form tenons on the ends of the seat side rails (E) and slats (G) [**Drawing 4**]. Check the tenons for a snug fit in the ¼" grooves. Then chuck a chamfer bit into your handheld router, and rout 1/16" chamfers along the ends and edges of the seat end rails (F) and the edges of the seat side rails and slats. Now use a sanding block to chamfer all of the tenon shoulder edges. To ease assembly later, sand slight chamfers on the ends of the side rail and slat tenons.

4 To make the fillers (H), rip a ¼"-wide strip from the edge of a ¾"-thick board 12" long. Then cut 12 fillers ⅜" long from the strip.

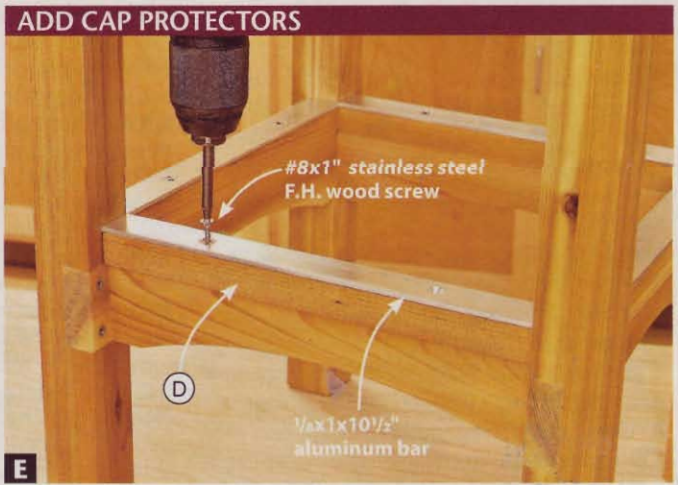
Note: *The grain on the fillers runs across the ⅜" dimension.*

5 Retrieve the hardboard spacers. Then, starting and ending with a 2½"-wide spacer, dry-fit 6 fillers (H) in a seat end rail (F) groove [**Photo C**]. The edges of the 2½"-wide spacers should be flush with the ends of the rail. Adjust the filler spacing as necessary, and glue the fillers into the groove. Remove the spacers before the glue sets. Repeat with the remaining end rail. Finish-sand the seat side rails (E), seat end rails (F), and slats (G). Assemble the seat [**Photo D**].

6 Apply glue to the top edges of the upper end rails (B) and side rails (C). Center the seat on the base, and clamp it in place.



Glue and clamp the seat side rail (E) and slat (G) tenons into the end rail (F) mortises. Check for square, and let the glue dry.



Position the ⅛×1×10½" aluminum bars on the rail caps (D), flush with the edges. Drill pilot holes, and drive the screws.

Apply the finish

1 Inspect the stool, and finish-sand, where needed. Apply an exterior finish. (We applied two coats of Cabot translucent exterior stain no. 3002 Cedar.) Double-coat all exposed end grain. To seal the bottom ends of the legs, see the **Shop Tip** at *right*.

2 To protect the rail caps (D) from foot wear, cut four 10½"-long pieces of ⅛×1" aluminum bar. Drill two countersunk shank holes in each one [**Drawing 1**]. To remove any marks or scratches and give the aluminum bars a uniform satin appearance, sand them with 320-grit sandpaper. (We used a 3M Sandblaster sanding sponge.) Then fasten them to the rail caps [**Photo E**]. Carry the stools out to the deck. (You made four, didn't you?) Arrange them around the bistro table, gather three friends, and serve up some cold drinks.

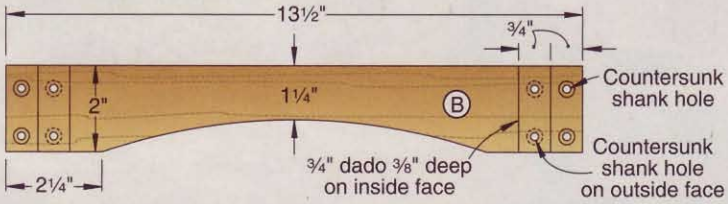
SHOP TIP

An easy way to seal outdoor furniture leg end grain

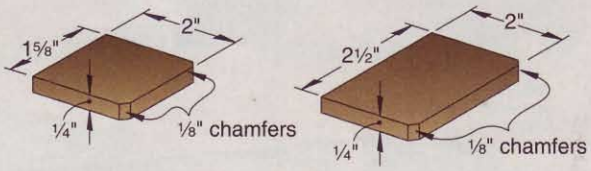
For long-lasting outdoor projects, always seal exposed end grain, especially the bottom ends of legs. Here's a hassle-free way to do this.

Place each leg in a shallow container, raising the leg off the bottom of the container, as shown *below left*. Then pour finish in each container, as shown *below*. After a few hours, the grain will be saturated. Now turn the furniture upside down, wipe away any excess finish, and let it dry.

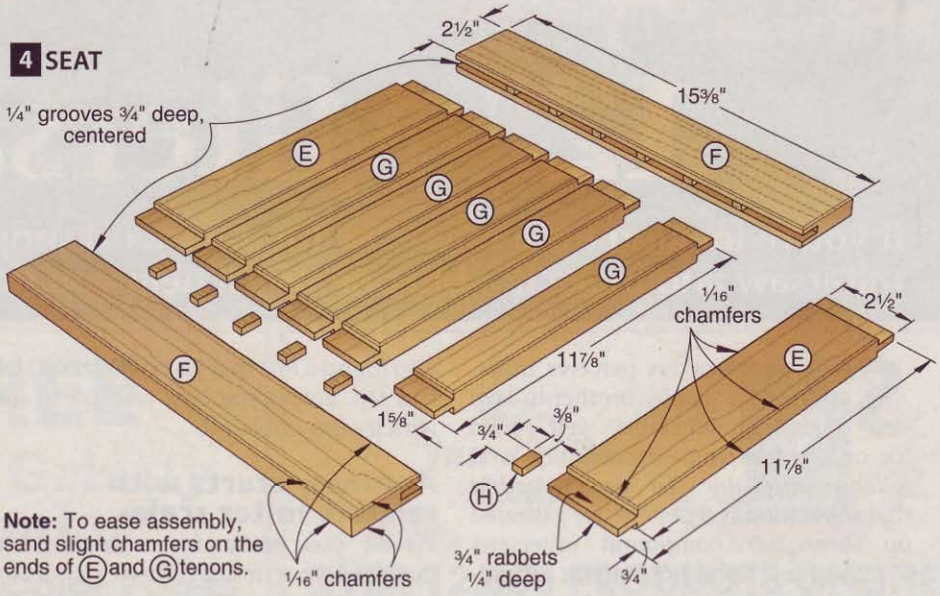
2 END RAIL (Inside face shown)



3 SPACERS



4 SEAT



Note: To ease assembly, sand slight chamfers on the ends of (E) and (G) tenons.

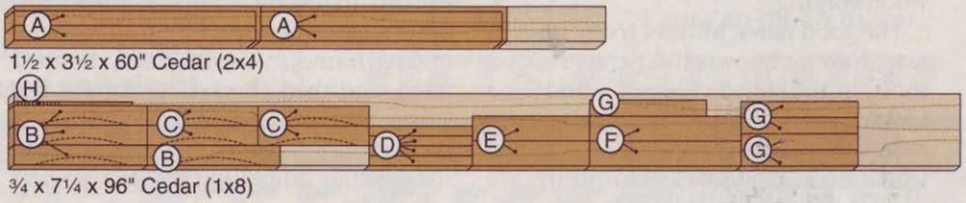
Materials List (for one stool)

		FINISHED SIZE T	W	L	Matl.	Qty.
Base						
A*	legs	1½"	1½"	24½"	C	4
B	end rails	¾"	2"	13½"	C	4
C	side rails	¾"	2"	11¼"	C	4
D	rail caps	¾"	1"	10½"	C	4
Seat						
E	seat side rails	¾"	2½"	11⅞"	C	2
F	seat end rails	¾"	2½"	15⅜"	C	2
G	slats	¾"	1⅝"	11⅞"	C	5
H*	fillers	¼"	¾"	⅜"	C	12

*Parts initially cut oversize. See the instructions.

Material key: C–cedar.
Supplies: #8×1", #8×1¼", and #8×1½" stainless steel flathead wood screws; ⅛×1" aluminum bar.
Blade and bits: Stack dado set, V-groove and 45° chamfer router bits.

Cutting Diagram



Written by **Jan Svec** with **Erv Roberts**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

12" Mitersaws

If you're looking for a mitersaw for your workshop, make it a compound mitersaw and make it a big one. We'll help you decide which one to buy.

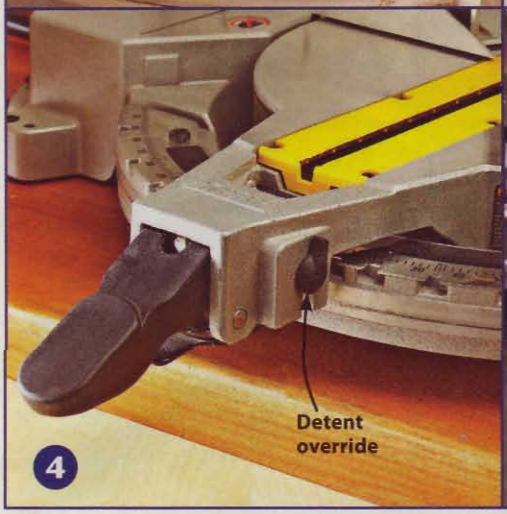
Some woodworkers perceive mitersaws like a shabby brother-in-law: crude, unpredictable, well suited for only a few unglamorous jobs, and reliably unreliable. To learn whether that reputation is deserved, we gathered up seven 12" compound mitersaws (CMS) to test them not only in a head-to-head showdown, but also in a search for a mitersaw accurate enough for woodworking.

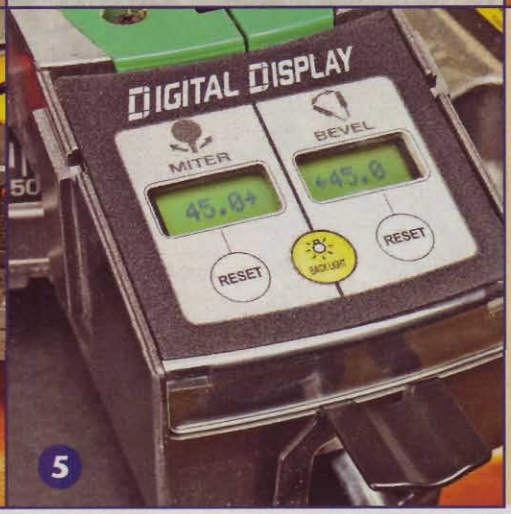
The good news: Most of today's mitersaws have outgrown their construction roots, still able to crosscut wood in a variety of angles, yes, but also precise enough for cutting components for picture frames, cabinets, and furniture. We also found a few that just can't shake the bad rap. Before you buy, read on to see which saws can cut it.

Accuracy starts with reliable miter scales

Would you settle for a bank that managed your money "pretty close to accurate"? No way! Likewise, you should expect your mitersaw's scales to be trustworthy. To test the accuracy of the saws' miter scales and stops, we cut 10"-square, mitered frames in 4"-wide stock, clamped them, and then checked for gaps in the joints. Most of the saws proved dead-on accurate right out of the box or after some minor calibration [**Photo 1** on *next page*]. However, the 45° stops on the Craftsman 21205 and Ridgid MS1250LZ both produced joints with gaps even after we calibrated them for square cuts at 90° by adjusting the fence and saw head according to their manuals. Neither saw provides a way to adjust any of the preset stops without changing the 90° setting as well.

Although the stops prove helpful in most cases, occasionally you might need to make a cut just a half-degree off the miter-stop setting (44½°, for example). Bosch's 3912 and DeWalt's DW715 feature detent overrides you can use to keep them from slipping into these stops. These two saws also feature ver-





1 If the stops prove inaccurate, make test cuts until you find the accurate settings, and then loosen the screws and rotate the scale to the new location.

2 To use a vernier scale align a fraction mark (in red) to its nearest whole-number mark (in black). This scale shows a 3½° angle.

3 When using Ridgid's miter scale cursor, the ½° markings are blocked by the end of the orange throat-plate insert.

4 You push DeWalt's cam-style handle down to lock it, and then lift to unlock. The detent override lets you bypass the molded stops.

5 Rely on Hitachi's digital angle finder for miters and bevels. It proved reliable at finding any angle accurately to within ½°.

nier scales [**Photo 2**], enabling you to dial in a cut to within ¼° anywhere on the miter scale. Use a vernier scale by lining up a fractional mark on the cursor with the nearest whole-number mark on the scale. For example, if you want 3½°, you line up the two ½° marks with 2° and 5°, as shown *above*.

Ridgid's MS1250LZ almost got points for having its entire miter scale marked in half- and whole-degree increments, but it's almost impossible to use because you can't see the half-degree marks inside the cursor window [**Photo 3**]. No points. DeWalt earns favor with its cam-style miter lock [**Photo 4**]. The other models feature screw-type threaded locks that sometimes nudged the miter setting when tightened.

Bevel angles continue to befuddle on most saws

The ability to cut bevels (by tilting the cutting angle of the blade) separates a compound mitersaw from a regular mitersaw. But setting bevels on most saws, frankly, can be hit or miss. Markings tend to be tiny, closely spaced, and located far back on the saw, making them difficult to read reliably. Plus, most bevel locks require a reach-around to the back of the saw, and the weight of the saw makes it nearly impossible to nudge a close setting to perfection.

Hitachi's C12LCH championed the bevel testing, with its digital readout [**Photo 5**] proving dead-on (within ½°) with no need for adjustment. Still, with that edge in technology, we'd like to see it accurate to within 1/10°, but Hitachi has no current plans to take it that far, said John Fries, associate product manager for woodworking tools at Hitachi. The C12LCH also has a fine-adjustment, rack-and-pinion knob on the bevel lock that allows you to easily zero it in.

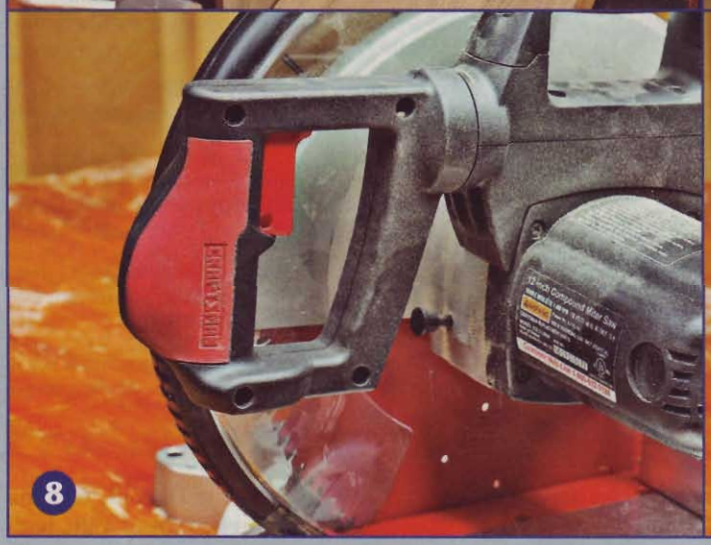
All the saws have bevel stops at 45°, but those on the Bosch, Craftsman, Makita LS1221, and Ryobi TS1552DXL must be moved to go beyond 45°. Then you have to recalibrate them to get back to 45°. We prefer the stops on the DeWalt, Hitachi, and Ridgid that can be moved aside temporarily for larger bevels, but instantly returned without recalibrating.

Bosch, DeWalt, and Ridgid have detent settings for 33.9°. This angle, when coupled with a miter setting of 31.62° (a stop on all but the Ryobi), allows you to make compound cuts on crown molding with it lying flat on the saw table. Because we prefer to cut crown molding in its spring-angle position leaning against the fence—see issue 174 (December/January 2006/2007), pages 48–50, or woodmagazine.com/crown for techniques on cutting and assembling crown—we wouldn't make these stops part of our buying decision.

Why a 12" mitersaw fits woodworkers best

How do you know if you need a 10" or 12" model? A 12" single-bevel CMS—with a head that tilts only to the left—will handle most woodworking applications in addition to all the projects around your home. Its 8"-ish crosscut capacity (see the chart on *pages 90-91* for specifics) is about 2–3" greater than a 10" CMS, and covers the vast majority of your crosscutting chores. Although a 12" CMS typically costs $50–$100 more than a 10" model (and a replacement blade will set you back $25–$50 more), you can get one for as little as $200.

If it's pure capacity you seek, a sliding compound mitersaw (SCMS) does provide 4–6" greater crosscut capacity than a nonsliding CMS. It also costs nearly twice as much, weighs 20–30 pounds more, and takes up more room on your workbench.



6 The dust-collection chute blocks Hitachi's laser as you lower the saw for a cut, so you might have to line up your cut at full height.

7 We could close the kerf opening on Makita's adjustable throat plate to make it a zero-clearance insert.

8 & **9** Craftsman's handle can be locked in at vertical and horizontal positions, and five stops in between. We preferred the vertical position when making bevel cuts, and the horizontal for no-bevel miters.

Lasers should do more than dazzle you

Four of the tested saws (Craftsman, Hitachi, Ridgid, and Ryobi) sport a recent craze in power tools: a laser line that's supposed to show you where the saw will cut. So, if you're going to have a laser on a power tool, it should be accurate, right? Take a bow, Hitachi and Ryobi. They proved dead-on accurate: Simply align the laser on your mark so the blade will cut on the waste side of the line. Hitachi's laser [**Photo 6**], mounted just below the dust-collection tube behind the blade, can be set to shine on either side of the blade.

Craftsman, Ridgid, and Ryobi feature nonadjustable disc-style lasers built into the arbor flange. Because the laser can't lie flat on the blade body, it must angle to shoot for the edge of the blade. For this reason, Ryobi's laser line begins on your mark at full height, then moves from right to left about 1/16" as you lower the blade—but the blade cuts on the line. We could not get Ridgid's laser closer than 1/16" to the left of the blade. (Ridgid and Ryobi said they will include adjustable lasers on all their mitersaws by midsummer 2007.) Craftsman's laser would go no closer than 1/8".

A quality blade greatly improves any saw

All of the tested mitersaws come with carbide-tooth blades better suited for construction than woodworking. Using each saw's factory blade, we cut 6"-wide, 1½"-thick hard maple with each, and then marked the ends with chalk. All of the saws left noticeable scoring marks as well as significant tear-out.

So, to get a true reading for power and cut quality, we equipped each mitersaw with a new 96-tooth, thin-kerf, Freud crosscut blade (LU74R012, Freud's recommendation for crosscutting hardwoods) and repeated our tests. The result: nearly flawless cuts with no scoring and almost no tear-out. The only blight—and this happened on each saw—was a slight gap in the center of the cut, which we attributed to blade deflection. Pulling 15 amps apiece, each saw handled our tests without stalling or bogging down, even when we tested with the factory blades.

Buying considerations that make a difference

• Throat-plate woes

Three saws (Bosch, Craftsman, and Ridgid) come with a blank throat insert, allowing you to make it zero-clearance when you plunge your spinning blade through it. We like this feature because it reduces tear-out and keeps small cut-offs from falling through. Makita [**Photo 7**] and Hitachi have adjustable throat plates that close up, although Hitachi's only closes to 3/8". DeWalt and Ryobi do not offer adjustable throat plates.

• Get a grip

Craftsman's saw features an adjustable D-style handle [**Photos 8** and **9**] that can be rotated 90° from horizontal to vertical in seven positions. We like this flexibility, especially when cutting at large bevel angles. We found no definitive advantage to any position; it's primarily a comfort issue for you to find your favorite position.

• More than just a pretty fence

All the mitersaws feature fences 4½" or taller near the blade for firm resistance to the cutting action and torque of the blade. Makita's and Hitachi's fences pivot away from the blade to the end of the fence to make room for the saw head on bevel cuts. The others slide away from the blade.

• Thumbs up

Bosch, Makita, and Ridgid feature safety switches that you must press with your thumb before activating the saw with the trigger. Bosch's switch is accessible on both the left and right sides, so it's convenient for right- and left-handers.

• Poor dust collection

While nearly all other power tools have added effective dust control methods, mitersaws continue to struggle with this. However, we're not beating up the manufacturers over this because the structure of a mitersaw makes dust collection inherently difficult. All seven models come with a dust bag, but none does a favorable job of gathering dust and chips. Craftsman gets a nod for equipping its saw with a rubber gathering tube closer to the blade, but it's only slightly better. We hooked up a shop vacuum to each saw and made cuts, and noticed improved dust collection (although still leaving about one-third of the debris on the saw and bench and in the air).

• Awkward extensions

It's always helpful to have extension wings that support long workpieces, but only four saws (Craftsman, DeWalt, Makita, and Ryobi) include them as standard equipment. And, only Makita makes this feature quick to remove (via thumbscrews) for transport. DeWalt has two Phillips-head setscrews you need to loosen first. Craftsman and Ryobi require you to flip the saw and remove screws and brackets from underneath.

An in-depth look at the 7 mitersaws in our test

Bosch 3912, $310

877-267-2499, boschtools.com

High points

- One of two saws with a detent override; this feature allows you to position the saw close to the miter stops without slipping into them.
- The 45° miter stops proved dead-on right out of the box in our 8-miter frame test.
- Its vernier scale helps you pinpoint a miter position accurate to within ¼°.
- Dual safety switches on the right and left sides make it convenient for you no matter which hand you use to operate the saw.

Low points

- The bevel stop system won't allow angles beyond 45° without resetting the stop. You have to recalibrate it to establish the 45° stop again.
- Miter adjustments were stiff though manageable.

More points

- The hold-down clamp features a quick-release lever; however, it gets in the way when not in use.

Craftsman 21205, $260

800-383-4814, craftsman.com

High points

- This saw features a bevel scale and cursor on each side of the head, allowing you to always see one of them clearly.
- The handle rotates from a horizontal to pistol grip, the only saw in the test with this feature.
- Extension wings add 20" of support to both sides of the table. And the cutoff stop fits on the wings from 11" to 18" from the blade.
- The hold-down clamp also works on the extension wings.

Low points

- The bevel stop system won't allow angles beyond 45° without resetting the stop. You have to recalibrate it to establish the 45° stop again.
- The 45° miter stops proved inaccurate even after we calibrated the 90° stop dead-on.
- The fence was not square to the table and had to be shimmed.
- The laser shines ⅛" from the cutline, making it tough to rely on it for accuracy.

DeWalt DW715, $330

800-433-9258, dewalt.com

High points

- Adjustable miter scale and cursor allowed us to dial this saw in for dead-on accuracy.
- One of two saws with a detent override; this feature allows you to position the saw close to the miter stops without slipping into them.
- Its vernier scale helps you pinpoint a miter position accurate to within ¼°.
- The cam-style miter lock proved superior to the screw-style locks of other models.
- Its 6¼" vertical cutting capacity at the fence topped the test.

Low points

- Sawdust buildup makes bevel-scale markings difficult to read.

More points

- The bevel stop allows for angles beyond 45° without recalibrating the setting, but requires a screwdriver to loosen the stop.
- You get 28" of support from the blade with a single extension wing, but you have to use a Phillips screwdriver to loosen the setscrews.

Hitachi C12LCH, $330

800-829-4752, hitachipowertools.com

High points

- This is the only saw with digital miter and bevel scales, which proved reliably accurate.
- A fine-adjustment knob makes sneaking up on bevel angles easy and precise.
- The single, adjustable laser proved accurate.

Low points

- We found a slight sloppiness in the miter stops, and the 45° stops proved inaccurate in our 8-miter frame test. (We relied on the digital readout for accuracy.)
- When depressed, the detent lever rubs the table as you change the miter angle.

More points

- Shim brackets allow you to set bevel angles beyond 45°.
- Hitachi makes this same saw without the digital readout but still with the laser (model C12FCH) for $280.

Makita LS1221, $295

800-462-5482, makitatools.com

High points

- The 45° miter stops proved dead-on right out of the box in our 8-miter frame test.
- This saw had the smoothest miter and bevel adjustments in the test.
- It was the only saw without annoying "throw" (upward and downward lurching) at motor start-up and stop.
- Extension wings support workpieces 19" from each side of the blade and tighten with thumbscrews.

Low points

- The bevel stop system won't allow angles beyond 45° without resetting the stop. You have to recalibrate it to establish the 45° stop again.
- The blade guard would not stay retracted when changing blades, making it more difficult.

Accuracy, ease of use pinpoint a winner

Although several of the mitersaws performed well enough to cut it in the *WOOD®* magazine shop, two stood out for unique features that we really like: the Bosch 3912 and the DeWalt DW715. They share Top Tool honors. Both saws offer similar cutting capacities as well as a detent override and a ¼° vernier miter scale. Bosch also has a dual safety switch, a zero-clearance throat insert, and a hold-down clamp. DeWalt has a cam-style miter lock, a retractable bevel stop with two settings, and one extension wing.

The Ryobi TS1552DXL earns Top Value honor in this test, not just for its low price, but also because it cuts accurately and includes several features we like (extension wings, cutoff stop, accurate laser).

Written by **Bob Hunter** with **Jeff Hall**

Dual-bevel mitersaws offer versatility—at a price

Most saws tilt only to the left for bevel cuts, but dual-bevel compound mitersaws tilt both left and right. Sounds cool, but is it really an advantage? We checked out DeWalt's DW716 and Hitachi's C12LDH, essentially the same as their respective saws in our test but with the ability to bevel right as well as left, and we found the dual-bevel saws equaled their single-bevel counterparts in every way, with the extra bevel the only distinction.

But is it worth the extra $60–$80? We find it handy if we're cutting bevels on long workpieces and don't have the elbow room to swing them around to cut the other end—although that calls for plenty of room on each side of the saw. Because the saw head tilts both ways, some manufacturers reduce the fence height, while others have sliding fences on each side.

A dual-bevel mitersaw also has value to left-handed folks who might prefer to hold their workpiece with their right hand and operate the saw with their left. And finally, because the motors are located more on top and in back of these saws, visibility improves on both sides of the blade.

BRAND	MODEL	MOTOR: BLADE SPEED (RPM)	MOTOR: ARBOR SIZE (1)	FACTORY BLADE, # OF TEETH (2)	LASER TYPE (3)	RANGE, EACH SIDE, DEGREES
BOSCH	3912	4,300	1	40	N/A	52
CRAFTSMAN	21205	4,000	1	40	W	48
DeWALT	DW715	4,000	5/8, 1*	32	N/A	50
HITACHI	C12LCH	4,000	1	32	S	52
MAKITA	LS1221	4,000	1	32	N/A	48
RIDGID	MS1250LZ	4,000	1	40	W	47
RYOBI	TS1552DXL	3,600	5/8, 1*	28	W	47

NOTES:

1. (*) Arbor is 5/8" with adapter for 1" blades.
2. All blades were thin-kerf except Bosch.
3. (S) Tool-mounted adjustable single laser
   (W) Washer-mounted
   (N/A) No laser on this model

Ridgid MS1250LZ, $270

866-539-1710, ridgid.com

High points

- A retractable pin offers bevel stops at 33.9° and 45°, as well as angles up to 48°.
- An open-leg metal stand, not shown, comes with the saw.

Low points

- The 45° miter stops proved inaccurate even after we calibrated the 90° stop dead-on.
- The burlap-like dust bag allows fine dust to escape through its pores.
- The laser shines 1/16" to the left of the cut, making it tough to rely on it for accuracy.

More points

- The miter scale is segmented in half-degrees for extra accuracy, but the marks are nearly impossible to see inside the cursor window.
- The horizontal hold-in clamp has a half-nut design that allows for quick adjustments, but when tightened even with little pressure it causes workpieces to lift off the table.
- In addition to its three-year warranty, Ridgid offers a lifetime service agreement offering free replacement parts.

Ryobi TS1552DXL, $200

800-525-2579, ryobitools.com

High points

- The 45° miter stops proved dead-on right out of the box in our 8-miter frame test.
- It has the only disc-style laser that proved reliable for accurately lining up cuts.
- This saw features a bevel scale and cursor on each side of the head, allowing you to always see one of them clearly.
- Extension wings provide workpiece support up to 21" from each side of the blade, and the cutoff stop mounts 11½" to 19½" from the blade.

Low points

- The bevel stop system won't allow angles beyond 45° without resetting the stop. You have to recalibrate it to establish the 45° stop again.
- The fence was not square to the table and had to be shimmed.
- The blade guard would not stay retracted when changing blades, making it more difficult.
- The burlap-like dust bag allows fine dust to escape through its pores.

More points

- The hold-in clamp holds stock against the fence without lifting, but has no quick-release on the threaded rod.

12" COMPOUND MITERSAWS MAKE THE CUT

MITER			BEVEL		CUTTING CAPACITIES, INCHES (5)					PERFORMANCE RATINGS (6)																ACCESSORIES (7)						
					MAX. WIDTH			MAX. HEIGHT		MITER				BEVEL																		
STOPS, DEGREES (ALL HAVE 0, 15, 22.5, 45)	RANGE, DEGREES	STOPS, DEGREES (ALL HAVE 0, 45)	FOOTPRINT WITHOUT EXTENSIONS, INCHES (W x D) (4)	WIDTH, INCLUDING EXTENSIONS, INCHES	AT 0° MITER	AT 45° MITER	AT 0° MITER, 45° BEVEL	AT 0° BEVEL	AT 45° BEVEL	EASE OF CHANGING POSITION	SCALE READABILITY	STOP RELIABILITY	LOCK, EASE OF USE	EASE OF CHANGING POSITION	SCALE READABILITY	LOCK, EASE OF USE	PORTABILITY	OBSERVED POWER	HANDLE/SWITCHES	FENCE, OVERALL ASSESSMENT	QUALITY OF FACTORY BLADE	EASE OF CHANGING BLADE	BLADE GUARD, EASE OF USE	THROAT INSERT, EFFECTIVENESS	DUST COLLECTION, AS EQUIPPED	STANDARD	OPTIONAL	CORD LENGTH, FEET	WEIGHT, POUNDS (8)	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (9)	SELLING PRICE (10)
31.62	-3–45	33.9	25 x 28	28	8	5⅝	8	5⅛	2⅞	A	A	A-	A	B	B-	B	A	A-	B+	A-	B	B-	A	B	B-	D,H,T	C,F,M,W	7	46.8	1	T	$310
31.62	0–45	—	23 x 34	41	8	5⅝	8	4⅞	2⅞	A	A-	B-	B+	C	A-	B	B	A	A	A-	C	A	A	A	B+	C,D,H,L,W	M	7	47.5	1	T	$260
10, 31.62	-3–48	33.9	25 x 37	40	7⅞	5⅝	7⅞	6¼	3¼	A	B+	B	A	B+	B	B	B	A	B+	A-	C	A	A-	C	B-	D,W	C,F,H,L,M	7	43.6	3	M	$330
31.62	-3–48	—	24 x 38	24	8⅛	5¾	8⅛	4⅝	2⅞	B+	A-	C	B+	A	A-	B	A-	A-	B+	A	C	B-	A-	B-	B-	D,H,L	C,F,M,W	9	47.8	5	C	$330
31.62	0–45	—	24 x 26	38	8⅛	5⅝	8⅛	4¾	3	A	A-	A-	B+	C	B+	B+	B-	A	B+	A	B	B-	A-	B+	B-	D,H,W	HC	7	42.2	1	C	$295
31.62	-3–48	33.9	25 x 28*	28	7⅞	5½	7⅞	4⅜	2⅞	A-	A-	B-	B+	B+	B-	B	B	A	B+	A-	B	A	A	A	C	D,HC,L,S,T	M	10	49.1*	3	T	$270
30	0–45	—	24 x 28	42	8	5⅝	8	4⅝	2⅞	A	A-	A-	B+	C	A-	B	B+	A-	B	A-	C	B-	A-	C	C	C,D,HC,L,W	M	7	46.5	2	T	$200

4. (*) Footprint for stand is 38 x 28".

5. Measured with ¾"-thick stock standing against the fence.

6. A Excellent
   B Good
   C Fair

7. (C) Cutoff stop
   (D) Dust bag
   (F) Crown molding fence
   (H) Hold-down clamp
   (HC) Horizontal clamp
   (L) Laser guide
   (M) Mobile stand
   (S) Stationary stand
   (T) Table extension
   (W) Extension wings

8. With all included accessories attached.
   (*) Ridgid stand weighs an additional 24.8 pounds.

9. (C) China
   (M) Mexico
   (T) Taiwan

10. Prices current at time of article production and do not include shipping where applicable.

Mitersaw Finger Savers

Mitersaws are so easy to use that we often forget their potential for mishaps. Follow these simple guidelines for safe operation.

Watch a FREE 4-minute video on Mitersaw Basics at **woodmagazine.com/videos.**

Don't do this at home! When you hold a workpiece this close to the blade, you risk having the saw grab it and yank your hand into the cutting action.

True story. A guy volunteers at a community home-building project. The coordinator asks him if he knows how to use a mitersaw. "Sure, no problem," he replies. They give him a task of cutting boards to length. To everyone's astonishment, he proceeds to the rear of the mitersaw and begins cutting boards by reaching over the top! (If you don't at this point know why this is dangerous, *please* finish this article before touching a mitersaw.) Thankfully, a volunteer who knows tools stopped the guy and gently coached him into using the correct technique—from the front of the saw.

While this anecdote merits a few chuckles, it also reveals how some folks take for granted the safe and proper methods for operating machinery—and how little they know about their tools.

Safety starts before you pull the trigger

Before you even plug in a mitersaw—or any tool for that matter—you must understand the fundamentals.

- Get to know your tool by reading the manual and familiarizing yourself with the saw's components and how they work.
- Never remove your mitersaw's safety guard or alter it in any way.
- Always unplug the saw before changing blades or performing any maintenance.
- Make a habit of wearing safety glasses and hearing protection.
- Don't wear loose clothing or jewelry when using the saw. Tie back long hair to keep it from getting near the blade.

How to give your board—not your saw—a hand

Unlike a tablesaw, where most of the blade turns below the table, a mitersaw exposes half of its blade during a cut. Even though the guard covers a good portion of the spinning blade, keep your hands out of the no-hands zone, typically 8" to each side of the blade, as shown *below left*. Instead, use hold-down clamps to secure short pieces, as shown *below right*. This also increases the accuracy of your cut because the blade sometimes can move a handheld workpiece slightly; a clamped workpiece stays put.

Outside the no-hands zone, hold a workpiece wherever it feels comfortable and you can get a firm grip. Make a habit of holding a workpiece where you

continued on page 94

KEEP YOUR HANDS FOR YOURSELF

Never hold a workpiece between the lines of the no-hands zone when cutting. Instead, hold it outside the lines or use a clamp.

A MUCH-NEEDED HELPING HAND

Use your mitersaw's hold-down clamp to safely secure workpieces while cutting. The clamp lifts out of the way when not needed.

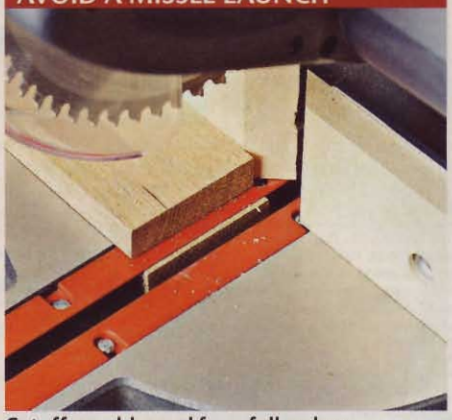
KEEP YOUR HANDS CLEAR

When cutting boards, position your hand so you can touch the end of the table's fence or auxiliary fence to keep clear of the blade.

DON'T ROCK THE BOARD

The uneven profile on this molding causes it to rock on the saw table. Instead of cutting it this way, flip the piece to its flat, stable side.

AVOID A MISSLE LAUNCH



Cutoffs could expel forcefully when contacted by a spinning blade; so stop the saw and clear them before your next cut.

also can grab the the end of the saw's fence or table, as shown *above*. This ensures your fingers won't be drawn into the blade's path.

Use proven techniques for safer cutting

■ Know how your mitersaw's motor works, and make your cuts accordingly. Soft-start motors and soft-grabbing brakes eliminate the up or down lurch of the saw head when you start and stop the machine. (Not every mitersaw includes these features, however. You have to learn through experience how to handle one of these saws to negate the lurch.) Once engaged, allow your saw to reach full speed before cutting. After the cut, allow the blade to stop before raising it. Lifting a spinning blade exposes your hand to possible contact, and can violently eject cutoffs as well as damage the workpiece.

■ Support long workpieces with stands, either shop-made (woodmagazine.com/support) or commercial (shown *below left*). This keeps them from teetering, and ensures your cuts will be square to the mitersaw table.

■ Make sure all workpieces lie solidly on the table; irregular pieces, such as the crown molding shown *above*, can shift and be ejected or pulled into the blade. Round workpieces or dowels can also roll or be pulled into the blade, especially on miter or bevel cuts. Secure them with a clamp before cutting.

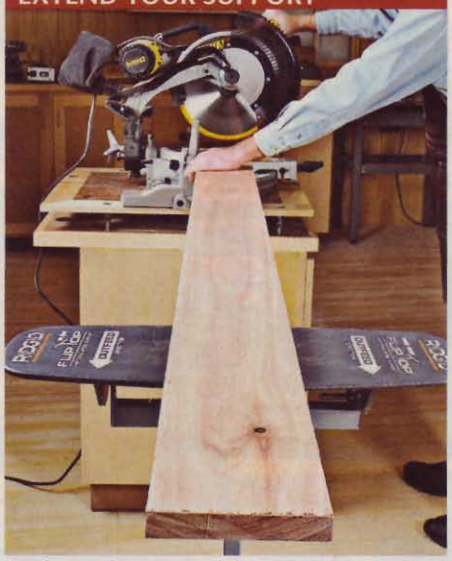
■ Always rest your workpiece against the fence. Cutting with a gap between the workpiece and fence could pull your hand into the blade.

■ Never attempt a rip cut on a mitersaw, as shown *below,* unless your stock is 12" or more wide. In this orientation, the fence provides little support for the workpiece, and the spinning blade could pull the board—and your hand—into the cut. Even if it doesn't get your hand, the kickback could propel the board into your body or face.

■ Remove small or thin cutoffs, shown *above*, that fall into the insert opening to avoid kicking them out with the blade's next cut.

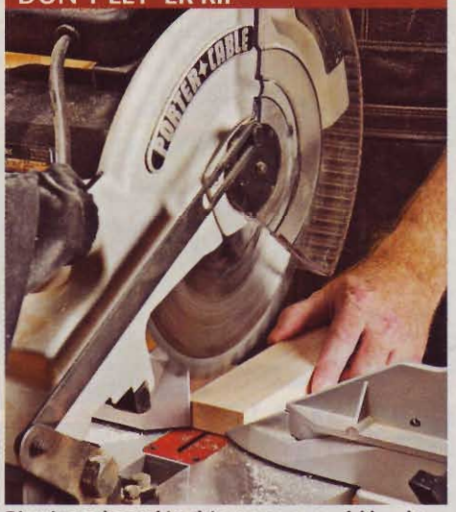
■ Sliding mitersaws require you to pull the motor/blade housing out on its rails, and then cut while pushing down and toward the fence. Never cut in a pull motion; the saw head could lurch forward and cause injury.

EXTEND YOUR SUPPORT



Work stands must hold boards level to the mitersaw table to ensure square cuts, so get one with a height adjustment.

DON'T LET 'ER RIP



Ripping a board in this manner could lead to serious injury because the blade could yank the board and your hand into the cut.

Set up your mitersaw for built-in safety

Now that you know how to use your mitersaw safely, let's equip it for best performance. First, anchor the saw securely to a workbench or jobsite stand to keep it from moving during a cut. And, clear the floor and workspace around the saw of anything that could make you trip and lose your balance.

Always use a sharp blade designed for your style and size mitersaw. For construction purposes—cutting dimensional softwood lumber—crisp, tear-out-free cuts are not critical, so a 40-tooth (10") or 60-tooth (12") crosscut blade proves a good compromise of price and performance. But, for precision woodworking and smooth cuts, usually in hardwood less than 1" thick, step up to an 80-tooth 10" blade or a 96-tooth 12" blade.

When crosscutting hardwood thicker than 1", Freud's Jim Brewer recommends a 60-tooth 10" blade or a 72-tooth 12" blade. He says ideally any

continued on page 96

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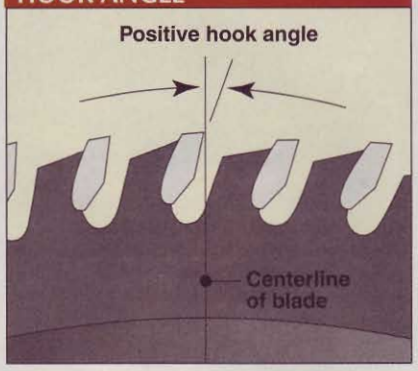
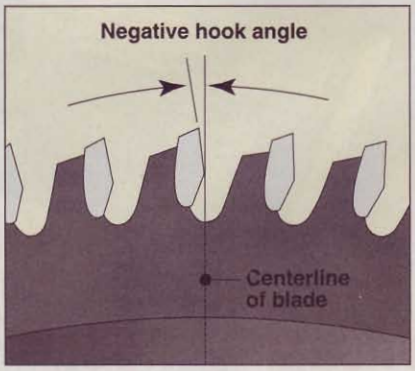
blade should have 5–7 teeth in the workpiece's thickness during the cut. More teeth cause heat buildup that burns the wood, and fewer teeth carry too much chip load and roughen the cut.

In addition to the number of teeth, the hook angle of those teeth proves critical as well. Compound mitersaw blades should have a hook angle (see drawing *below)* between 10° and –5°. Sliding mitersaws—which move forward and backward as well as up and down—should use a less-aggressive blade: from 5° to –5°.

As for the kerf, or the thickness of the blade's teeth, standard- and thin-kerf blades perform equally well in terms of cut quality. But, under-powered saws should use a thin-kerf blade to avoid overloading the motor.

HOOK ANGLE



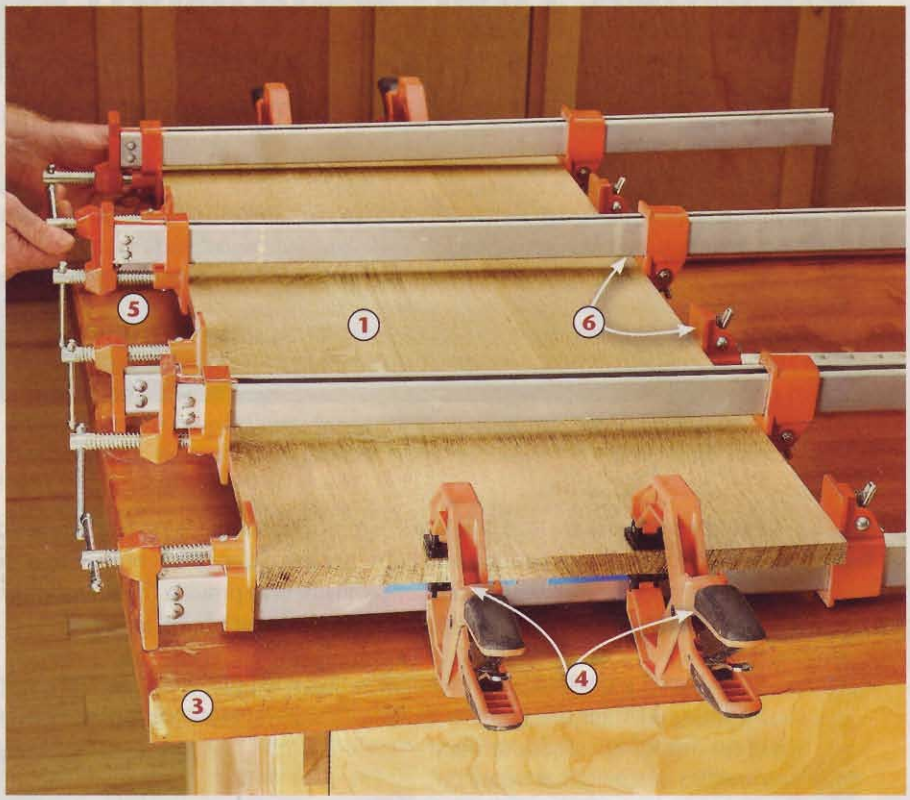


Positive hook angles create more aggressive cuts because the tips of the teeth pitch forward into the wood. Negative hook blades ease into a cut because the teeth are pitched back.

Special thanks to the Power Tool Institute for providing power-tool safety information. PTI also makes available free mitersaw (and other tools) safety videos and DVDs in English and Spanish at powertoolinstitute.com.

Clamp down on glue-up mistakes

Try these 10 tips for better results every time.



Gluing up and clamping a project proves just as critical as the machining and finishing stages, so take the time to get it right. These tips will save you time, grief, and, quite possibly, your project.

A dry-fit solves problems

1 It's tough to solve fitting dilemmas while your glue bonds with the wood, and there's no going back after it has set. To keep yourself out of that bind, always dry-fit your assembly—that means no glue—to verify all joints fit together as planned, as shown *above right*. If joints don't fit, go back and solve problems before applying glue.

Dry-fitting shows which clamps and how many are needed, and where on the assembly they go. You also get an idea of how long it will take to glue and clamp the assembly—you might discover that the process takes longer than the glue's open time allows (typically less than 15 minutes for yellow glue). In that case, divide the work into sub-assemblies. For example, when building an end table, make two assemblies of two legs with their rails and let them dry, rather than trying to assemble all four legs and rails at the same time.

2 You also can save yourself time and worry during a glue-up with some prep work during the dry-fit. Rather than trying to remove messy glue squeeze-out in hard-to-reach places after you've put the clamps on, take this time to mask those troublesome spots, such as the inside corners of a chest or case, as shown at *right*, with painter's tape. This will help you remove excess glue with ease.

8 ways to prevent warped or uneven glue-ups

Edge-glued panels make up a big part of many large furniture projects, so you want them to turn out perfect. To avoid panels that warp or require great work to flatten them, try these tips:

3 Work on a flat surface or benchtop. Assembling a panel on a warped surface can transfer that warp onto your glue-up.

4 Add clamps over gluelines along the ends to keep the board faces flush.

5 Use similar clamps. Mixing clamps in a specific application can cause differences in clamping force and lead to warping. The photo at *top* shows matching aluminum bar clamps to pull the boards together edge to edge. It's okay to use hand clamps on the ends because they apply clamping force in a different direction than the bar clamps.

6 Alternate clamps over and under a panel or long glue-up to balance the clamping pressure.

continued on page 100

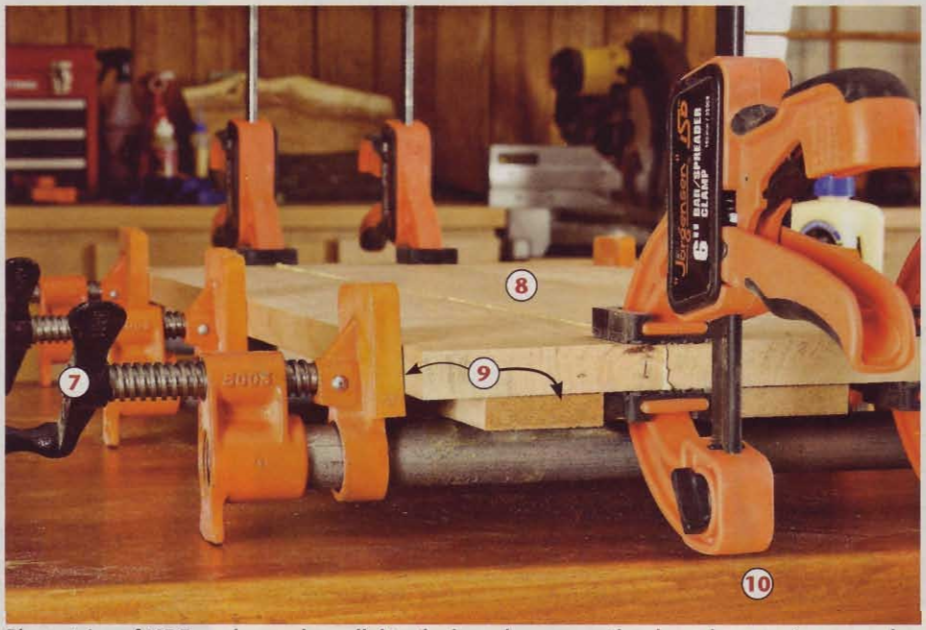
Cleaning up glue squeeze-out will be a snap because the excess glue sticks to the painter's tape instead of the wood surface.

7 Snug up and tighten clamps evenly. Add a little pressure to each clamp in sequence rather than tightening each one fully before moving on to the next clamp.

8 Don't overtighten your clamps. Too much force can cause a panel to cup, as well as squeeze out too much glue. Apply only a thin film of glue to the wood surfaces (excess glue will just squeeze out and require cleanup); then use just enough clamping force to produce glue squeeze-out that forms a uniform thin line or beads along the glue line.

9 Align the center of the workpieces being clamped with the center of the clamping force, in this case, the screw on the pipe clamps. This places your glue joint directly in line with the clamp's greatest pressure. Use scrap stock to elevate the assembly to the screw height.

10 Finally, leave a clamped assembly on your flat table or workbench for 30 minutes before moving it. This gives the glue time to bond with the wood. Moving it right away or leaning it against a wall or cabinet could cause warping.



Place strips of MDF or plywood parallel to the boards—across the clamp bars or pipes—and away from the glueline to elevate a panel.

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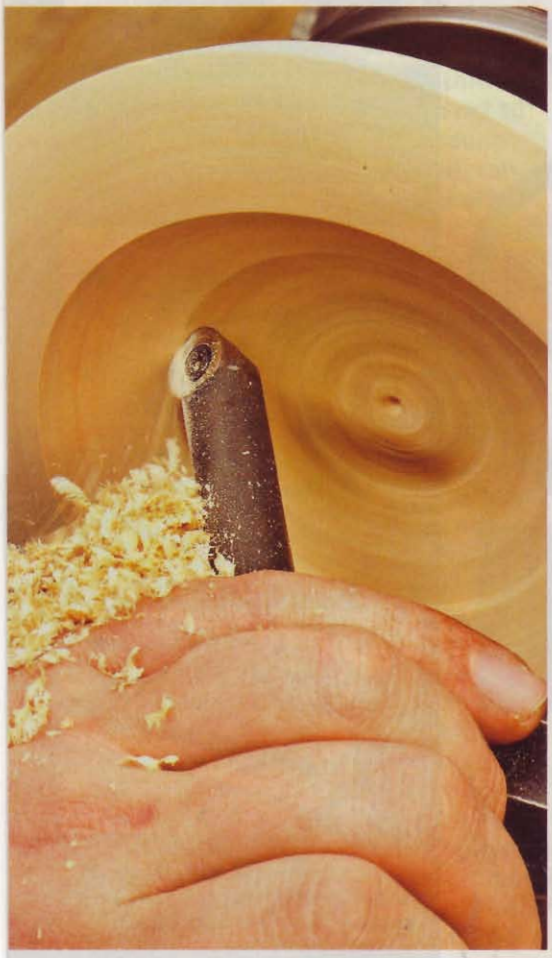


The turning tool you'll never sharpen

The one thing that makes woodturning less enjoyable for me is having to stop every few minutes to sharpen my tools. That nuisance is a memory with the Hunter Carbide Hollowing Tool.

The business end of this tool is an extremely sharp and durable ½" round solid-carbide cutter. You use only a small portion of the cutter at any given time (the action is similar to shear-scraping with a round-nose scraper), and when that portion gets dull, you simply loosen the set screw, rotate the cutter a partial turn, and you're back in business with a sharp edge in just seconds.

The Hunter Tool made fast work of hollowing a 10"-diameter, 5"-deep side-grain bowl I turned from spalted soft maple, but I had trouble getting a really fine finish in this soft wood. So I used high-speed steel tools for the fine finish cuts.

To see how the carbide cutting edge would hold up, I challenged the Hunter Tool by turning an end-grain lidded box from a chunk of white oak. Even after this punishing task, the cutter appeared to have dulled little, if at all.

Without changing tools, I went from rough hollowing cuts to fine finish cuts ready for sanding. The tool excels at hollowing end grain and easily scrapes areas, such as the transition between the bottom and side of an end-grain box, that are difficult to get at with other tools.

Although it takes a little practice to find the sweet spot—I found it with the cutter 35°–45° from horizontal—when you do, the tool cuts smoothly and quickly. While certainly not catch-proof, the cutter on the Hunter Carbide Hollowing Tool doesn't self-feed, so a catch isn't the disastrous event common with a bowl gouge.

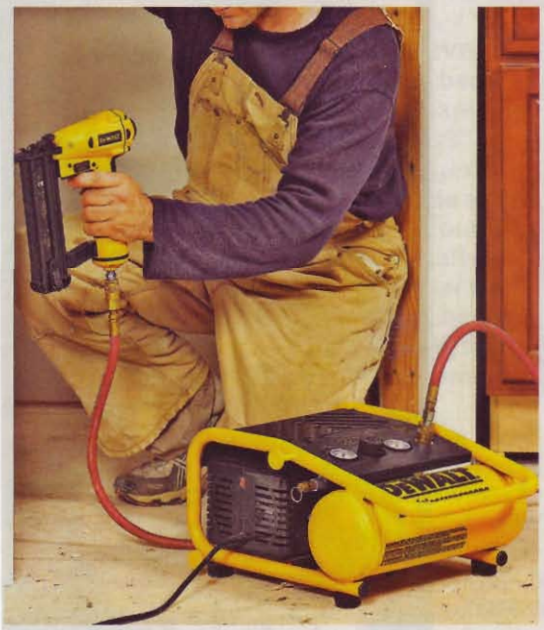
When the cutter has made a complete rotation (I figure I'll get at least six fresh edges), simply replace it. The new cutter costs $20, making the Hunter Tool as wallet-friendly as it is user-friendly, especially for beginning wood turners.

—Tested by Jan Svec

Hunter Carbide Hollowing Tool

Performance	★★★★★
Price	$100, #4 (½"-dia. cutter); $85 #3 (⅜"-dia. cutter)

Hunter Tool Systems
612-922-1197; hunterwoodturningtool.com



A compact, whisper-quiet air compressor

I love those new lightweight air compressors that pack enough punch to drive a finish nailer, brad nailer, or pinner, yet are easily carried into the house for occasional trim jobs. Weighing in at 28 pounds, DeWalt's 1-gallon D55140 weighs less than half as much as the 4-gallon units we used to call "compact."

But this compressor is no lightweight when it comes to performance. I used it to power my framing nailer, and it drove 10, 3½" nails before the motor kicked in to top off the tank. Even while recharging I was able to drive more framing nails.

What impressed me most, though, is how little noise this unit makes. While trimming out a door in a neighbor's house, I fired up the D55140 right next to my wife and the neighbor while they chatted. Neither of them had to raise their voices to continue talking.

The pressure gauges and adjustment knobs are easily accessible, and the unit carries like a dream: well balanced and close to my body without banging my knee with every step. You can buy the D55140 by itself or comboed with DeWalt's 2" brad nailer and a 25' hose to make it an even better value.

—Tested by Steve Feeney

D55140 Trim Compressor

Performance	★★★★★
Price	$170; $220 with brad nailer and hose (model D51238K)

DeWalt
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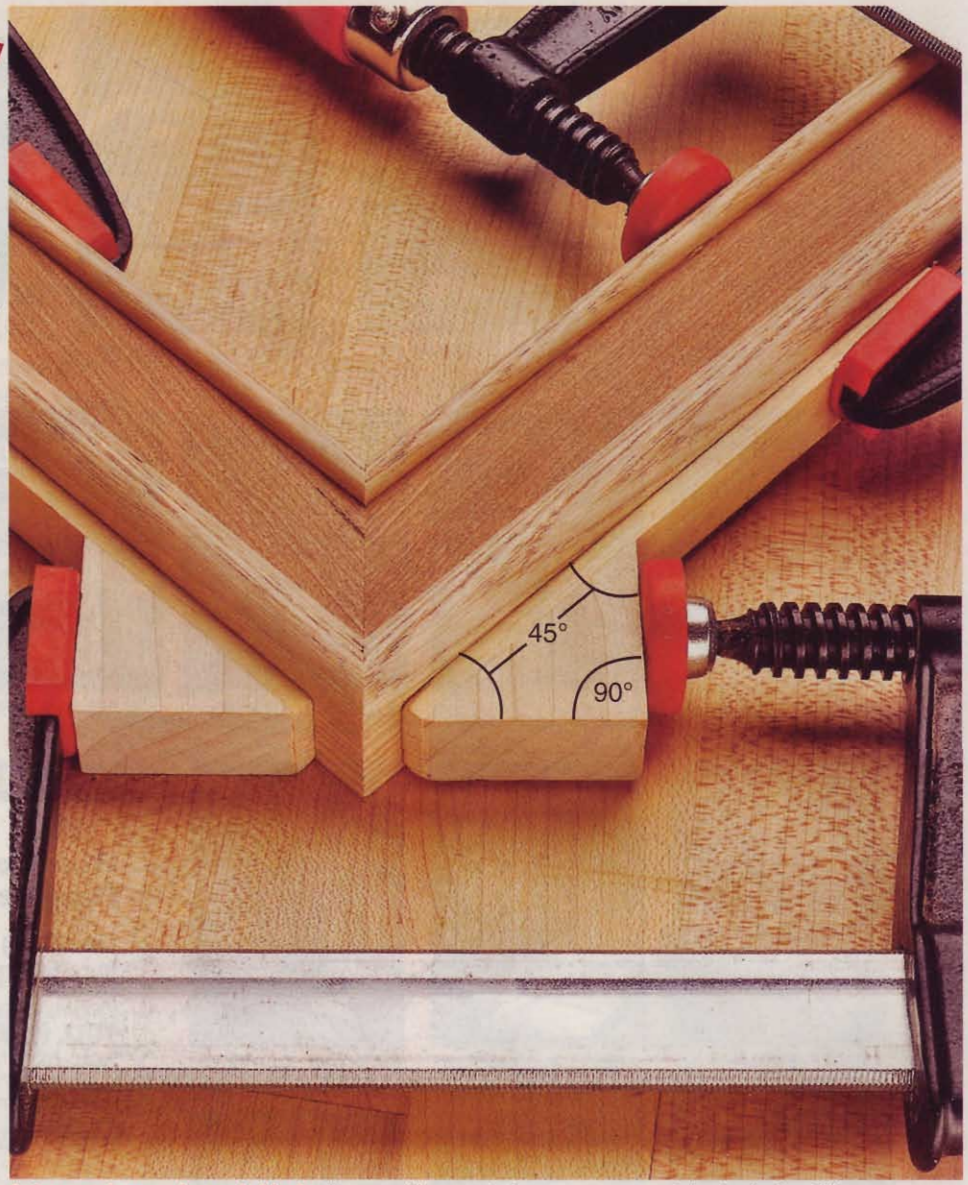
Put the Clamps on Miter-Joint Slippage

Don't let your frame projects give you the slip. Here's how to keep a mitered corner in place.

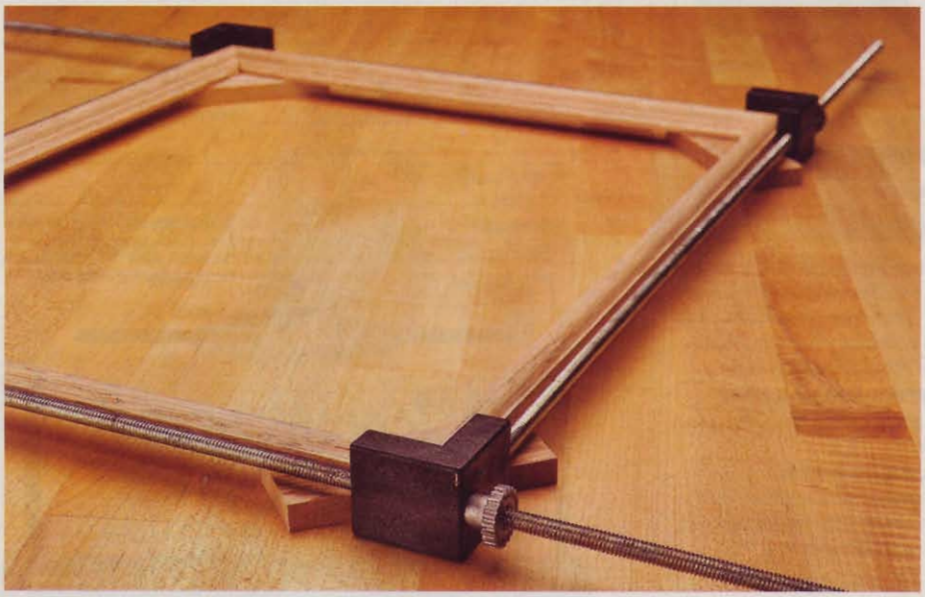
Woodworkers make countless miter joints and, in the process, they test plenty of ways to clamp those joints. Which way is best? Your choice of a clamp depends on the shape and size of the workpieces, as well as your tool-buying budget.

You can handle most mitering jobs with the wooden shopmade angle blocks shown at *right*, combined with standard bar clamps. Make several pairs while you're at it. But if you do a lot of mitering, a well-designed commercial clamp will speed your projects along.

We suggest that you avoid buying miter clamps until you need them, rather than committing money and storage space to such specialized tools. If you do buy miter clamps, practice using them before you start gluing. Now, take a look at some of the models we like.



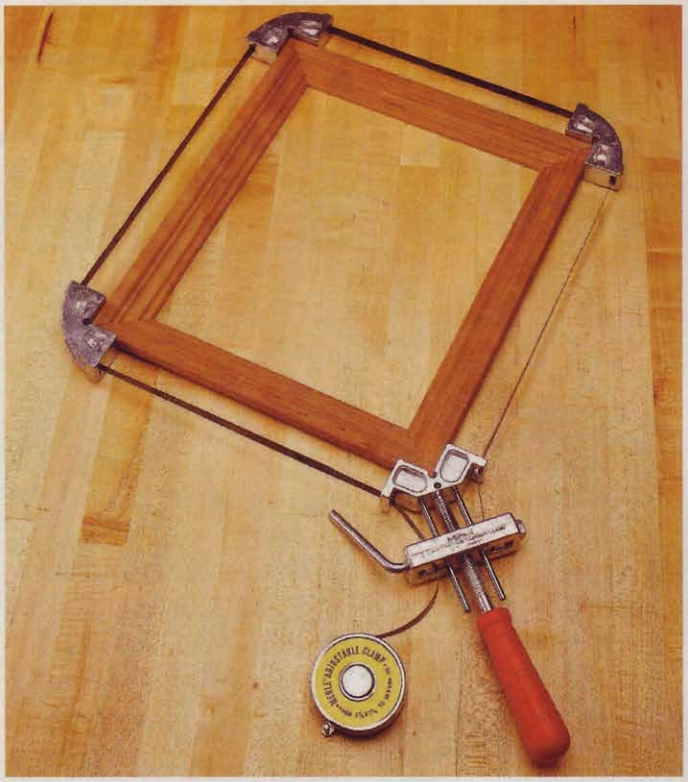
A shop-made remedy: angle blocks. Use your tablesaw and miter gauge to cut two right triangles from ¾" scrap. Glue the long side of each triangle onto a ¼×¾×6" strip of plywood or solid wood to make angle blocks. Clamp each block onto one piece of the joint with a small clamp, then clamp across the joint, as shown. If the blocks slide, glue a strip of 150-grit sandpaper on the inside face of each one.



Threaded rod frames tackle medium-size jobs. Turn the knurled nuts on the threaded rods to clamp rectangular frames sized from 3×5" up to nearly 4×4'. We used scrap pieces to support this narrow molding and center the clamping pressure on the middle of the workpiece. Changing settings can be frustratingly slow, so you might want to buy "Quick Nuts," which can be slid along the rods into position, then screwed tight. Woodworker's Supply sells the basic clamp set no. 71-712 with eight 24" threaded rods, four corner brackets, four extension couplings, and four brass nuts for $21. A package of four "Quick Nuts" (no. 922-216) costs $10.49, and extra brackets (no. 113-456) are $2.49 each. Call 800-645-9292 or visit woodworker.com.

Continued on page 110

Quick and easy spring clamps. These create sufficient tension to clamp lightweight frames or moldings. However, you need a spreader tool, and the points of the clamps leave tiny holes in the wood. When that's a problem, you can add rubber suction cups to the tips, but don't expect those cups to grip on small curved surfaces. Grizzly Industrial sells a starter set (no. H3703) with a spreader, four medium clamps, and four suction cups for $40. Call 800-523-4777, or visit grizzly.com.



Metal band clamps align as they tighten. This clamping system uses 90° corners to square up assemblies, and a fabric band that's sturdy enough for heavy-duty jobs. Remove the corners, and the band alone handles circles, multi-sided frames, and chair leg assemblies without marring the wood. The fabric stretches slightly after tightening, however. To buy the no. 9012 Merle clamp, shown *above*, for $27, call MLCS at 800-533-9298, or visit mlcswoodworking.com.

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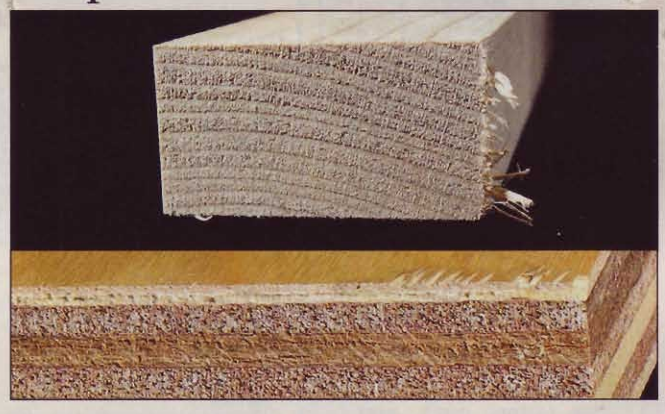

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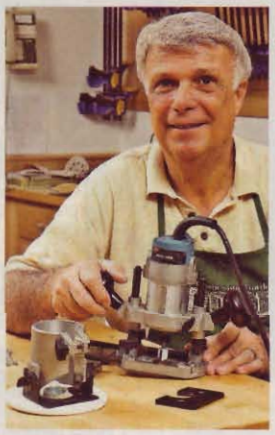
What's Ahead

A sneak peek inside the October issue (on sale August 28)

Nesting tables
Basic joinery—just biscuits and screws—ensures that you can build this handsome pair in a weekend.

Bench tool system
Looking for easy, affordable projects? Our Basic-Built project series kicks off with this vertical organizer for benchtop tools. Simply slide out a tool and its bolt-on tray, sit them atop the wheeled workstation, and go to it.



The best tool I ever bought
From tablesaws to handsaws, our editors and contributors reveal 13 of their all-time favorite tools.

Get into woodturning for under $600
Here's everything you need to know, including how to buy your first lathe, turning tools, sharpening system, four-jaw chuck, and other essentials.

Storage bins
Build any or all of these modules from inexpensive, no-finish-required, melamine panels. Perfect for the garage or basement.

Aftermarket mitergauges and sleds
Would you like to repeatedly cut miters accurate to within 1/10° with minimal setup? Several of the 14 accessories we reviewed can do just that.

Plane-fun kid's shelf
Here's a project sure to delight its young recipient. You'll even find suggestions for how you can involve the child in its construction.

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